

# Montana Snowbowl Master Development Plan

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# **1. Introduction**

Snowbowl Ski and Summer Resort is located on the Missoula Ranger District of the Lolo National Forest and has operated under a Forest Service Special Use Permit since December 1961. Snowbowl is 12 miles from Missoula, the second most populous city in Montana, making it one of the closest ski areas to a metropolitan area in the country.

Lift served downhill skiing northwest of Missoula first started at Snow Park Ski Area on the west side of TV Mountain in the early 1950's. The group that operated Snow Park decided that the Snowbowl location would better serve their needs so in 1961 they moved the lifts, a Poma lift and rope tows over to the Snowbowl site. The first chairlift was installed in 1962 and a T-bar on the top in 1966. This T-bar was replaced by a double chairlift in 1984. Since 1984, the permit holder has been MSB, Inc. Snowbowl is currently completing projects from the last master plan approved in 1996. Strong skier demand and a re-evaluation of the needs and objectives of Snowbowl have led to this new master plan proposal.

## **1a. Summary**

This master development plan proposes to reestablish downhill skiing (alpine, telemark and snowboard skiing) on TV Mountain and to modify the remaining but not completed projects approved by the 1996 Decision Notice for Snowbowl's last masterplan. This proposal is to expand the current 1,138 acre Special Use Permit area by 1,088 acres to include TV Mountain, making the new Special Use Permit area 2226 acres. The total resort area including the 80 acres owned by MSB, Inc. (the owner and operator of Montana Snowbowl) would increase to 2,306 acres from its current 1,218 acres. This Master Plan describes the construction of five new lifts, additional ski terrain including 33 new ski trails and expansion and upgrades to the existing facilities. The calculated capacity, Skiers At One Time will increase from 1,408 to 2,382 skiers. The completion of the projects will be phased over a ten-year period as operating conditions and revenues permit. A project summary and conceptual schedule is listed in Table 21 on page 34. In Appendix B a comparison is made between the current resort facilities with those approved in the 1996 Decision Notice and this new master plan when fully completed.

## **1b. Goals and Objectives**

Snowbowl's basic underlying goals are unchanged from the 1996 plan and they are to offer safe, high quality recreation and provide for the financial capabilities to continue to make improvements and upgrades to the facilities and operation of Snowbowl.

Objectives and needs to meet these goals are:

1. Expand skier opportunity to meet the current and future demand. Snowbowl is currently operating at capacity and can not meet the current skier demand.
2. Improve public safety on the Snowbowl Road, Forest Service Road 698. The need to improve the Snowbowl Road has been obvious for some time. This need was a major element in the 1996 Plan and Decision Notice. The Forest Service currently has no additional funds for improvements.
3. Add improvements and ski terrain that will bring Snowbowl's terrain mix in better balance with the skier market and allow Snowbowl to remain competitive with other local resorts.
4. Provide the skier facilities and terrain to meet the future additional demand when the Snowbowl Road is finished.
5. Take advantage of Missoula's amenities and Snowbowl's nationally recognized expert terrain to attract regional/ national visitors by expanding and balancing the ski terrain.
6. Relieve congestion and improve skier distribution especially at the LaValle chairlift and the beginner terrain at the base area.
7. Enhance summer use to better balance summer and winter operations by including additional hiking/ mountain biking trails and improved on mountain facilities.

These objectives and needs will be accomplished by developing additional acreage that will provide a greater variety of ski terrain, better matching the skier market, especially increasing lower ability level terrain as well as satisfying the demand for advance, intermediate and expert terrain. An increase in the overall capacity and subsequent increase in users will allow the costs of the road improvements to be spread over a larger group of users and will make these expenditures financially feasible.

## 2. Integration of Forest Service Objectives

The 1996 decision notice summarized the general Forest Service policies that give existing concessionaires an opportunity to expand their operations to meet existing public needs before offering new sites for development (FSM 2342.03,2). In addition, Forest Service policy encourages year round recreation use at private developed concession sites (FSM 2340.03,4). Forest Service policy further encourages that ski areas are used year round when such use is compatible with or enhances natural resource based recreation opportunities and does not require additional specialized facilities (FSM 2343.11,1). The Lolo Forest Plan (page II-1) identifies one forest management goal to “Provide for a broad spectrum of diverse recreation involving sufficient acreage to maintain a low user density compatible with public expectations.” More specific goals for each portion of the Lolo forest are identified in the Forest Plan. The existing ski area is in Management Area 8. Goals for Management Area 8 provide opportunities for developed facilities to accommodate downhill skiing. Visual quality standards are stated so management practices will follow guidelines for the “Modification” category of visual quality objective. In this category impacts of management activities will be visually assessed from the nearest viewpoints identified on the “Sensitivity level maps” on file with the Forest Service.

In the proposed expansion to incorporate TV Mountain, approximately 300 acres, along LaValle creek in the northern part of the proposed expansion are in Management Area 16. The goals for Management Area 16 are:

1. Provide healthy stands of timber and optimize timber growing potential to develop equal distribution of age classes as they optimize sustained timber production.
2. Provide for diverse recreation opportunities, wildlife habitat and livestock use.
3. Maintain water quality and stream stability.

The standard used for visual management is that management practices will follow guidelines identified in the “Modification” or the “Maximum Modification” visual quality objective. Modification objectives will normally be assigned to foregrounds and midgrounds visible from the viewpoints identified as visually sensitive. Background and areas not seen from these viewpoints will be assigned Maximum Modification objectives. Maps of these viewpoints, guidelines and distance zones are on file with the Forest Service and must be consulted to determine the visual quality objective.

The remaining acreage of the proposed expansion, approximately 800 acres, is in Management Area 25. Goals of Management Area 25 are:

1. Achieve the visual quality objectives of Partial Retention.
2. Provide for healthy stands of timber and optimize timber growing potential within the constraints imposed by Goal 1 while providing for diverse recreational opportunities, wildlife habitat and livestock use.

Visual quality standards for this management area call for management practices for all resources to follow guidelines for the Partial Retention visual quality objective from the viewpoints identified as visually sensitive.

The other standards for each management area are not mentioned here but are incorporated by reference to the Forest Plan

Although Management Areas 16 and 25 allow for diverse recreational opportunities and would accommodate consideration of expansion, this area would need to be changed to MA 8 (Ski Area) if the proposed expansion is approved. It is requested as part of this proposal that the Lolo National Forest Plan be amended so that land in the proposed expansion that is currently Management Area 16 and 25 be changed to Management Area 8 (Ski Area).

### **3. Site and Environmental Characteristics**

#### **Topography**

The existing and proposed ski area terrain lies on portions of three mountains, TV Mountain (elevation 6,800 feet), Big Sky Mountain (elevation 7,600 feet) and Point 6 (elevation 8,000 feet). Currently, only a portion of Point 6 and TV Mountain are utilized. The existing ski area uses all of Big Sky Mountain with 360 degrees of skiing off the top. The proposed area off of TV Mountain would also offer 360 degrees of ski able terrain. There are two drainages associated with the ski area, Butler Creek and LaValle Creek. The base area is located at an elevation of approximately 5,000 feet in the Butler Creek drainage. Ski terrain associated with Butler Creek is primarily a south-southwest aspect with steeper slopes in the 40-70% range. However, terrain in LaValle Creek is more moderate and has a west and north facing aspect. Terrain off TV Mountain has a wide range of aspect and slope. With north being 12:00 on a clock dial and going clockwise, the eastern aspect from 12:00 to approximately 5:00 is a steeper terrain varying from 40-80%. From 5:00 – 7:00, the south to southeastern aspect, the terrain is more moderate varying from between 35-60%. Starting with the ridge at 7:00 there is a large area of ideal intermediate terrain with slopes varying between 20-35%. The west and northwest aspects steepen somewhat to 40-60%. Nearly all the terrain on TV Mountain is potentially skiable with the exception of some rocky areas on the eastern side.

#### **Vegetation**

Vegetation at MSB is mainly conifer forest dominated by Douglas-fir and western larch at the lower elevations. The higher elevations are dominated by subalpine fir and lodgepole pine with scattered whitebark pine and Engelmann spruce. Common shrubs at the lower elevations include ninebark, serviceberry, elderberry, Scoulers willow, snowberry, mountain maple, ceanothus, ocean-spray, spirea and hawthorn. Common shrubs at the upper elevations include alder, blue huckleberry, twin flower and grouse whortleberry. Common grasses include bluebunch wheatgrass, Idaho fescue, mountain brome and elk sedge. Common forbs include woodrush, beargrass, glacier lily, lupine, arnica, fireweed, yarrow, strawberry and pearly everlasting.

The forest throughout most of the existing ski area is dominated by mature stands of timber. Portions of some stands may meet old growth criteria. The forest throughout most of the proposed expansion area on TV mountain is also in the mature size/age class except for recent harvest units on the west side of the mountain. Occasional dead and dying trees are scattered

throughout the area. Evidence of past and current infestations of mistletoe, bark beetle, budworm and blister rust are scattered across the area. Hazardous trees will be removed if they pose a risk to structures, facilities or recreationists. Blown down trees will be removed as needed to eliminate hazards, fire risk and pest infestation.

Disturbed sites including road cuts, graded portions of ski runs and near structures have vegetation that includes smooth brome, orchard grass, slender wheatgrass, crested wheatgrass, redtop, Kentucky bluegrass and other exotic plants mixed with native plants that have re-invaded from adjacent areas.

Noxious weeds are present as scattered plants and isolated patches, mainly along roads and at other disturbed sites. Noxious weeds at MSB include Canada thistle, spotted knapweed, diffuse knapweed, hounds tongue and goatweed (St. Johnswort). Noxious weeds will continue to be controlled according to state law by a combination of mechanical, cultural and chemical control methods. Noxious weed inventory was made in June of 2003 finding light to moderate weed infestation of lower slopes predominately spotted knapweed (129 acres), Hounds tongue (1.1 areas-light) plus lesser infestations of musk thistle, oxeye daisy, Canada thistle, common tansy, leafy spurge, sulfur cinquefoil and hawkweed (light or trace).

Riparian areas at MSB are restricted to the immediate stream banks of perennial and intermittent streams. Little or no jurisdictional wetlands are present although some small areas along streams may qualify. Other jurisdictional areas under the Clean Water Act include perennial, intermittent and ephemeral streams that have a defined bed and bank.

No livestock grazing currently occurs within the existing permit area or the proposed expansion area. The area is poorly suited to grazing due to steep slopes, narrow riparian areas, high elevation and dense conifer forest.

No threatened, endangered or sensitive plant species have been documented at MSB. No endangered plants are listed in Montana. Three plants are listed as threatened in Montana including *Howellia aquatilis*, *Silene spaldingii* and *Spianthes diluvialis*. There is no habitat for these three species in the MSB area or the Missoula Ranger District. No sensitive plants were found in the area during the 1993 Northside Timber Sale evaluation. However, there is potential habitat for sensitive plant species in the MSB area.

### **Soils**

Most soils at MSB are formed in Precambrian quartzite and argillite including the Holloway, Phillcher, Tevis and Winkler soil series mapped in the county soil survey. A small area on the southern border of the proposed expansion area has soils formed in Precambrian limestone (Repp soil series). The surface soil at higher elevations and north aspects contains significant amounts of volcanic ash. Soil textures are predominantly loams and sandy loams with high rock content. These forest soils are covered with a surface layer of partially decomposed needles, twigs, branches and other forest "litter" that protects the soil from erosion by wind and water. The Lolo National Forest Lands System Inventory has identified eight soil/land type mapping units at MSB including 30QE, 30QG, 33UA, 41QA, 64MC, 64QC, 64QE and 64QG.

The soil types that occur at MSB are very stable with no evidence of landslide or slump activity. They generally do not present special problems for roads, bike/hike trails, ski trails, lift towers, foundations, on-site septic systems or other components of ski area development except for those imposed by slope steepness. These soils can be revegetated quickly for erosion control and aesthetic purposes. The Lolo Landsystem Inventory has rated each of the eight soil/landtype units at MSB as having low to moderate erosion hazards.

## **Hydrology**

Snowbowl is drained by Butler and LaValle Creeks which are intermittent in the headwater areas but become perennial within or near the existing ski area boundary and proposed expansion area. Snowbowl is in the middle Clark Fork TMDL planning area. Neither Butler Creek nor LaValle Creek are listed on the state TMDL list of impaired streams. No new stream crossings or culverts are proposed that would directly impact these streams.

## **Air sheds**

Snowbowl is in the state's Zone M air shed which includes the greater Missoula Valley area. The Rattlesnake Wilderness Area is a federal Class 2 air shed and Flathead Indian Reservation border Snowbowl to the north is a federal Class 1 air shed.

## **Terrestrial Wildlife**

No endangered terrestrial wildlife species or potential habitat are present at MSB. No recent sightings of threatened wildlife species have been made at MSB including gray wolf, grizzly bear, Canada lynx and bald eagle. These four species may pass through the area occasionally. Most of the existing MSB boundary is within the Rattlesnake Lynx Analysis Unit (LAU) and is potential habitat for lynx. Preliminary analysis suggests that the existing and proposed development would not exceed guidelines in the Lynx Conservation Strategy for habitat components in this LAU. MSB is just outside of the Northern Continental Divide Ecosystem Grizzly Bear recovery area. The occupied habitat line does not currently include MSB but may in the not so distant future. No records of sensitive terrestrial wildlife species are available for MSB. The most likely sensitive terrestrial wildlife species to occur is the flammulated owl. It is possible that wolverine or fisher could visit the area on rare occasion. Terrestrial wildlife management indicator species present at MSB include elk and pileated woodpecker.

## **Aquatic Wildlife**

No endangered aquatic wildlife species or potential habitat are present at MSB. Bull trout (threatened) have been found in Butler Creek in low densities but their presence in LaValle Creek is uncertain. Cutthroat trout (sensitive) occur in both Butler and LaValle Creeks. The most likely other sensitive aquatic wildlife species to occur include the boreal toad, Northern leopard frog and Coeur d' Alene salamander. No aquatic management indicator species are present at MSB.

## **Visuals**

The proposed expansion area is visible from I-90 at LaValle Creek and west from the junction of US 93. The expansion is visible from US 93 north from the junction of I-90 approximately three miles. The expansion is also visible from the Missoula valley floor west of the airport. The most direct view of proposed ski runs is in the vicinity of the pulp mill approximately 10 miles southwest of TV Mountain. Only portions of the proposed ski runs would be visible from any one location due to the effects of aspect, tree height and run width. There are existing roads and timber harvest throughout the proposed expansion area. The Forest Plan Visual Quality Objectives for the proposed expansion area are discussed in Section 2, Integration of Forest Service Objectives on page 4.

## **Cultural Resources**

Cultural resources (rock cairns) have been identified near the electronics facilities on TV mountain. The remainder of the area is considered as low probability for cultural resources due to steep slopes and heavy timber cover.

## **Avalanche Hazard**

On the steeper slopes in the existing ski the potential for avalanches (avalanche hazard) has been noted in past development plans. However, with regular explosive control work and ski stabilization by frequent skier traffic throughout the areas, there has been no significant avalanche activity. There are no significant avalanche hazard areas identified in the expansion area.

## **Snow Cover**

Although snowfall varies yearly, snow depths and accumulation in upper elevations have been consistent in allowing Snowbowl to open in early December and close in early April. Snow making in lower elevations has made up the difference between high elevation and low elevation snowfall in the early season. Robert Brandenberger in his 1992 "Montana Snowbowl Development Plan Alternatives" felt that 2 inches of snow water equivalent (SWE) or approximately 12-18 inches of settled, unpacked snow is necessary to start skiing. Snow depths are available from snow course on the top of TV Mountain and at Snowbowl (although only from January 1 on). Table 1 shows the 10-year average snow depths on approximately the first of the month for the snow courses at the top of Hot Fudge (7500 ft) and TV Mountain (6800 ft) and the snow water equivalent (SWE) on TV Mountain. Over the last several years, informal measurements have been taken throughout the proposed ski terrain on TV Mountain with particular emphasis on the south and southwest facing slopes at the lower elevations. It has been noted that the snow depths here are identical to snow depths in the existing ski area of the same elevation regardless of aspect up until approximately mid March.

**Table 1**

<b>1992-2002 10 YEAR AVERAGE SNOW DEPTH AND SWE</b>						
	<b>January 1st</b>		<b>February 1st</b>		<b>March 1st</b>	
	SWE	Depth	SWE	Depth	SWE	Depth
<b>HOT FUDGE</b> Elevation 7500 ft	NA	51.4	NA	69.1	NA	78.8
<b>TV MOUNTAIN</b> Elevation 6800 ft	7.9	32.4	12.0	43.7	14.1	48.9

### **Electronic Sites**

There are three Forest Service designated electronic sites in or near the area. The existing ski terrain includes one on the summit of Big Sky Mountain. There is another site on the summit of Point 6 that is adjacent to the North LaValle portion of the ski area boundary. The proposed expansion to TV Mountain would include the electronic site on TV Mountain. When the road is open, all three sites are accessed via FS Rd 9962 (Point 6 Road) or FS Rd #19080 (old Point 6 Road). During winter the Big Sky site can be reached via the Snowbowl chairlifts or snow vehicles while the other two sites are only accessible on snow vehicles. With the expansion to TV Mountain this site would be accessible for electronic site users via the “C” chairlift as well as the current access on Forest Road #4297 via snow vehicles. Forest Road # 19080 would not have skier traffic and would continue to be used for electronic site maintenance vehicles. Snow vehicle routes would not need to be changed. Although these routes will cross proposed ski trails, this is the same situation that has existed within the current ski area for over 40 years without conflicts. An alternative route up ski trail B113 or B4 would also be available and would offer easier travel for snow vehicles on compacted snow and would minimize electronic site traffic crossing ski trails on the west side of TV Mountain.

## **4. Existing Facilities**

Snowbowl provides alpine skiing and snowboarding on 1218 acres. 1138 of those acres are under a special use permit through the Lolo National Forest, and 80 acres lie on private land owned by MSB Inc. There are 161 acres of developed ski runs supplemented by approximately 75 acres of open bowls and 500+ acres of tree-skiing terrain. During a typical ski season the area will open the last week of November and close the first or second week of April. During the main part of the season the ski area is open 7 days a week and during the shoulder seasons, it is open weekends with limited weekdays.

Snowbowl is currently working on the projects from the development plan approved in the April 1996 Decision Notice. In that decision several improvements, including several ski trails and two lifts cannot be started until the access road is improved. The details on these trails and lifts are discussed in the specific sub-sections to follow in this section. Those improvements are included in this Existing Facilities section but are listed separately. The current facilities and what the facilities will be when the 1996 Plan are fully completed are also summarized in Appendix B.

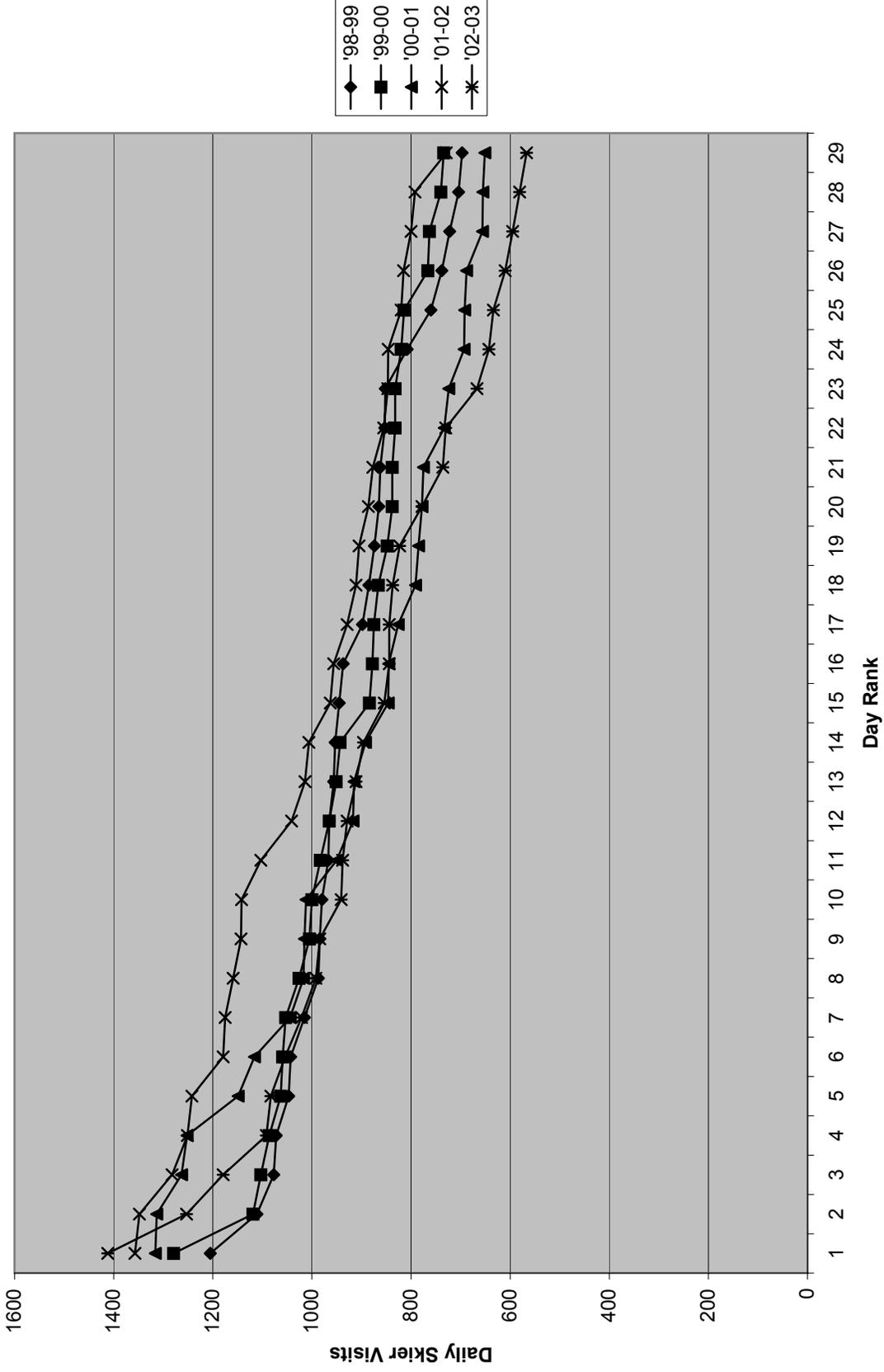
#### 4a. Capacity Measurement

In the ski industry facility capacity is frequently measured in terms of the number of skiers that can be comfortably handled at any given time. This is referred to in as Comfortable Carrying Capacity "CCC" or Skiers At One Time "SAOT" (See Appendix D for more information on capacity and SAOT). This measurement is used for lift capacity, ski run capacity and building capacity. It is important to remember that the calculated value for SAOT is a *relative measurement* used to compare ski areas and to project the effect of changes. Although there may be peak days where the Skiers At One Time, SAOT is exceeded this shouldn't occur more than a few days a season. It is the Snowbowl management's goal to provide a high level skiing experience and as such would tend to be conservative when applying capacity measurements or SAOT. With this philosophy in mind, while the current *calculated* SAOT for lifts is 1,408; for ski trails 1,510; and base facilities 1629, the operation seems to provide the best experience with 1,200 skiers or less at one time.

This can be confirmed by charting the daily number of skiers from the most attended days to the least. Bob Brandenberger used this technique in his evaluation of Snowbowl Alternatives in 1992. He pointed out that skiers will accept crowds in excess of comfortable capacity on a few holiday and peak season weekend days, but if crowding persists they will go elsewhere. The curve will drop sharply and flatten out at about the area's comfortable capacity. In that evaluation the curve flattened out between 800 and 900 skiers/day, which correlated with the estimated comfortable capacity SAOT of 800 skiers/day at one time. Since then the Grizzly chair has been upgraded, the parking lot enlarged, base facilities expanded and more trails added, increasing the capacity or SAOT. Chart A on page 8 graphs the 30 most attended days for the last five ski seasons and tends to flatten out around 1000 to 1100 skiers/day, confirming Snowbowl management's estimate of SAOT of 1200 skiers.

To be consistent with previous plans and to allow comparisons, the *calculated* SAOT for various facilities will be used throughout this plan; however, when measuring utilization (page 19) the capacity measurement based on actual experience of 1200 skiers at one time will be used. Utilization is a measure of capacity that's used in the ski industry that compares the comfortable daily capacity or skiers at one-time "SAOT" to the average skier visit

Chart A Skier Visits on Peak Days



## 4b. Existing Lifts

Snowbowl has two aerial lifts, both fix-grip double chairlifts. The number 1 chairlift, “The Grizzly Lift”, operates out of the base area rising 2,000 vertical feet and has the capacity of 1150 persons per hour. This lift was originally installed in 1962 and then it was substantially rebuilt and upgraded in 1994. The second aerial lift is chair 2, the “LaValle Lift”, operating out of the LaValle Creek pod with a vertical rise of 1,000 feet, from 6,600 feet to the summit at 7,600 feet. Two surface lifts are utilized at the base area. One is the Sunrise T-bar, installed in 1984, that services novice and intermediate skiing on Sunrise Bowl. The rope tow, which was originally installed in 1961 and upgraded and moved in 2000, services beginner terrain on "First Run". The total hourly capacity of these four lifts is 4,061 skiers per hour. Factoring in utilization ratios, the total skiers at one time, “SAOT” (explained above), is 1,408 skiers. Please refer to Appendix C for complete lift statistics and calculations of lift capacities.

In the April 1996 Decision Notice, two additional lifts were approved. One is a double chair, the “High Roller chairlift” which would service essentially the same terrain as the current LaValle Creek chair, plus some additional runs off Upper Spartan. The second is a T-bar on the upper North LaValle Creek area off of Hot Fudge, servicing beginner and low-intermediate terrain. The total hourly capacity of these two additional lifts is 1,350 skiers per hour, adding additional 350 Skiers At One Time, SAOT, to the total capacity of the ski area. Existing lift specifications and capacity are summarized in Table 2 and the approved lift specifications and capacity in Table 3. The grand total of all lifts existing and approved is listed under Table 3.

**Table 2 Existing Lift Specifications**

Name	Type	Year Installed	Slope Length Feet	Vertical Rise Feet	Hourly Capacity Persons/hr	Ride Time in Minutes	Vertical Transport Feet (000)	SAOT Skiers at one time
Grizzly Chair	Double Chair	1994*	5350	1970	1150	12	2,266	764
LaValle Chair	Double Chair	1984	3250	972	1200	7	1,166	465
Sunrise T-bar	T-bar	1984	1476	508	811	3	412	123
Beginner Tow	Rope Tow	2000*	500	70	900	1	63	56
<b>Totals</b>					<b>4061</b>		<b>3907</b>	<b>1408</b>

\* The original Grizzly chair (installed in 1962) was upgraded and rebuilt in 1994; the rope tow was replaced with a rebuilt tow in 2000.

**Table 3 Approved But Not Yet Installed Lift Specifications**

Name	Type	Year Installed	Slope Length Feet	Vertical Rise Feet	Hourly Capacity Persons/hr	Ride Time in Minutes	Vertical Transport Feet (000)	SAOT Skiers at one time
High Roller Chair	Double Chair	----	5150	1240	850	13	1,050	302
LaValle T-bar	T-bar	----	1000	300	500	2	150	48
<b>Total Approved</b>					<b>1350</b>		<b>1200</b>	<b>350</b>

<b>Plus Existing</b>		<b>4061</b>		<b>3907</b>	<b>1408</b>
<b>Grand Totals – Existing and Approved Lifts</b>		<b>5411</b>		<b>5107</b>	<b>1758</b>

#### 4c. Existing Ski Terrain

The existing ski terrain at Montana Snowbowl consists of 47 named trails and runs as well as numerous unnamed runs, open bowls and tree skiing. Snowbowl has an open boundary policy but with access to off area terrain through designated exit gates. There is use of off-area terrain including terrain off Point 6 and the eastern side of TV Mountain. This off-area terrain that is accessed through the ski area is not patrolled, promoted or inventoried by the ski area. While this terrain increases the overall capacity, its use is inconsistent (conditions vary widely) and is not included in the capacity measurements. In accord with the Confederated Salish and Kootenai Tribes, the ski area boundary shared with the Reservation boundary (North and West LaValle) is closed. To protect the Rattlesnake Wilderness, the boundary along the North Dakota Downhill (Trail 33) is closed.. These management policies are part of Snowbowl's Site Operating Plan that details operating policies as regarding issues involving the Forest Service and the public lands. This document is revised annually and approved by the Forest Service.

From the 1996 Plan runs # 72, 57, 65, 66, 60 and 62 have been completed ( runs # 60 and 62 are part of the whitebark pine study area). All the remaining runs (see Table 8 page13) except #51 are to be constructed after the access road, "Snowbowl Road" is improved.

#### Existing Ski Terrain – Distribution by Ability Level

Table 4 summarizes the existing ski terrain acreage grouped by ability levels. In Table 5 the approved but not constructed trails are included with the existing terrain, giving the potential acreage by ability level. From the analysis of the existing terrain based on ability levels it appears that Snowbowl's terrain mix is skewed towards upper level skiers. Even after completing the trails approved in 1996 the percentage of acres of the three lowest ability levels goes from 8.2% to 10.3%. However, to more accurately evaluate the terrain mix factors such as terrain SAOT, location and type (open slope, trees, cat track, groomable, etc.) need to be considered.

**Table 4 Summary of Existing Ski Terrain Acreage by Ability Levels**

Ability Level	Level	Area in acres	Current mix as a percent of total
Beginner	0	0.8	0.3%
Novice	1	4.0	1.7%
Lower Intermediate	2	14.9	6.2%
Intermediate	3	32.6	13.6%
High Intermediate	4	46.5	19.4%
Advanced	5	40.8	17.0%
Expert	6	100.6	41.9%
TOTALS		240.1	100 %

**Table 5 Summary of Existing and Approved Ski Terrain Acreage by Ability Levels**

Ability Level	Level	Area in acres	Approved mix as a percent of total
Beginner	0	0.8	0.3%
Novice	1	12.5	4.6%
Lower Intermediate	2	14.9	5.4%
Intermediate	3	34.1	12.4%
High Intermediate	4	61.1	22.2%
Advanced	5	43.9	15.9%
Expert	6	107.9	39.2%
TOTALS		275.2	100 %

The next tables, Table 6 and Table 7, summarize the existing and potential ski terrain based on capacity, or skiers at one time, “SAOT”. The terrain SAOT is derived by multiplying the acceptable density per acre of a given trail by the acres of that trail. Because there is considerable overlap in ability levels the terrain has been summarized into three basic groups: Beginner, Novice and Lower Intermediate; Intermediate and High Intermediate; Advanced and Expert. In today’s skier market this grouping makes the most sense. For example, it is common that a skier on their first day may well ski Level 0, 1 and 2 trails if the snow conditions are good and they are average in learning progression. This is due to the improvements in equipment, instruction and grooming. The same can be said for the other ability levels.

Acceptable skier density (skiers/acre) will vary from regions of the country and between ski areas in a given region. Reviewing the density values that other ski areas in Montana have used and factoring in Snowbowl management’s desire to provide a high level of skier satisfaction, the following density values were used: for the group of beginner/novice/lower intermediate-15 skiers per acre; for intermediate/high intermediate- 10 skiers per acre; and for advanced/expert- 3 skiers per acre. Using these ratios, Montana Snowbowl currently has a calculated ski run capacity of 1,510 skiers at one time and if all the ski trails were constructed in the 1996 plan, the ski terrain capacity would be 1830 skiers at one time or SAOT. One note about *calculated* ski terrain SAOT is that while it is a useful measurement for making comparisons it can be misleading if it is thought of as a measure of absolute capacity, like measuring seating capacity. For example, ski terrain SAOT calculations assume that skiers are uniformly distributed on trails and that the snow conditions are consistent on a daily basis, both of which are rarely or ever true.

Tables 6 and 7 further list these SAOT’s as percent of the total SAOT and compare these SAOT’s to industry guidelines of skier market mix. (Summary listing is also in Appendix B).

**Table 6 Summary of Existing Ski Terrain Capacity by Ability Levels**

Ability Level	Level	Area in acres	Guideline for Skier density Skiers/acre	Calculated SAOT	% Total SAOT	Skier Market Mix %
Beginner, Novice and Lower Interm.	0, 1 and 2	19.9	15	296	20	30
Intermediate and High Intermediate	3 and 4	79.1	10	790	52	45
Advanced and Expert	5 and 6	141.4	3(5 groomed)	424	28	25

Total 1510

**Table 7 Summary of Existing & Approved Ski Terrain Capacity by Ability Levels**

Ability Level	Level	Area in acres	Guideline for Skier density Skiers/acre	Calculated SAOT	% Total SAOT	Skier Market Mix %
Beginner, Novice and Lower Interm	0, 1 and 2	28.2	15	423	23	30
Intermediate and High Intermediate	3 and 4	95.6	10	952	52	45
Advanced and Expert	5 and 6	151.8	3(5 groomed)	455	25	25

Total 1830

Even after factoring for SAOT there is a shortage of lower level terrain. However, what is not apparent from these tables are other factors like trail location and type. For beginners and novices the only true open slope terrain available is at the base and is bordered by busy access trails (Rope Tow and Lower Sunrise). During days when the ski area is busy, this terrain gets quite crowded. Considering this additional traffic a skier density of 15 per acre probably is too high for these trails. In addition all of the novice trails (level 1) are cat tracks (Second Thought). The addition of the remaining North LaValle trails will improve the novice terrain but there are significant problems with North LaValle that are discussed on page 21. On the other side of the spectrum, improvements in equipment and grooming have allowed skiers to ski at higher levels and in areas that rarely were skied in the past, creating more demand for advanced and expert terrain especially powder and tree skiing. This type of skiing has not been listed in the “industry guidelines” but is a major part of the skiing experience at Snowbowl and there is a strong demand for more of this terrain. (It is common to find moguls in the trees next to designated trails at Snowbowl.) An increasing demand for expert ski terrain has resulted in more use of “off area” terrain. Snowbowl’s Off Area Policy has been designed to control the use of off area terrain and to protect sensitive areas beyond the ski area boundary. Please see the first part of Section 4c page 11 for information on off area terrain and policies.

On the next page Table 8 lists the existing and the approved ski trail specifications.

Existing and Approved Winter Trail Inventory Table 8								
From Montana Snowbowl Ski Area								
ID	Ability	Name	Vertical Ft.	Horiz. Ft.	Avg.Slope %	Avg.Width Ft.	Acres	
<b>Trails Existing</b>								
29	E	0	Rope Tow	70	500	14.0%	70	0.8
18	E	1	Second Thought	610	4000	15.3%	14	1.3
19	E	1	Second Thought, continues	480	5250	9.1%	14	1.7
57	E	1	Lower Second Thought	120	1400	8.6%	12	0.4
72	E	1	Upper Second Thought	240	2024	11.9%	14	0.7
24	E	2	Lower Sunrise	90	330	27.3%	250	1.9
1	E	2	Hot Fudge	940	3200	29.4%	160	11.8
31	E	2	Deschamps Traverse	300	1300	23.1%	42	1.3
60*	E	3	White Bark Pine Traverse	300	3000	10.0%	14	1.0
3	E	3	Grandstand	740	2200	33.6%	110	5.6
4	E	3	High Park	980	3200	30.6%	200	14.7
5	E	3	High Roller	370	1400	26.4%	210	6.7
6	E	3	Hi Roller Out Run	40	1000	4.0%	50	1.1
7	E	3	HR Mission Cutoff	90	640	14.1%	28	0.4
16	E	3	Upper Spartan	440	2400	18.3%	170	9.4
62*	E	3	Clarks Nutcracker	280	792	35.4%	170	3.1
38	E	4	Centennial	200	1800	11.1%	14	0.6
23	E	4	Sunrise Bowl	500	1220	41.0%	300	8.4
32	E	4	Upper North Dakota DH	370	1600	23.1%	70	2.6
33	E	4	North Dakota DH	90	2000	4.5%	14	0.6
34	E	4	Lower North Dakota DH	560	2450	22.9%	80	4.5
35	E	4	Lower ND Cattrack	40	1140	3.5%	14	0.4
36	E	4	Paradise	1180	3200	36.9%	130	9.6
39	E	4	Longhorn	1220	3400	35.9%	85	6.6
43	E	4	Fox Trot	100	1100	9.1%	8	0.2
66	E	4	Huckleberry	260	616	42.2%	120	1.7
44	E	4	Useless Traverse	160	800	20.0%	50	0.9
46	E	4	Bowl Outrun	720	3240	22.2%	14	1.0
21	E	5	Mogul Alley W Cattrack	60	560	10.7%	14	0.2
2	E	5	Whipped Cream	560	1440	38.9%	165	5.5
8	E	5	Big Sky	240	800	30.0%	70	1.3
9	E	5	Mission Magic	330	1000	33.0%	350	8.0
17	E	5	Spartan Headwall	610	1360	44.9%	230	7.2
20	E	5	Mogul Alley	260	600	43.3%	200	2.8
26	E	5	Upper Grizzly	880	2400	36.7%	180	9.9
27	E	5	Grizzly Glades	260	700	37.1%	100	1.6
42	E	5	Chicken Chute	700	1800	38.9%	100	4.1
22	E	6	Levitation	200	380	52.6%	70	0.6
28	E	6	Grizzly Chute	920	1800	51.1%	185	7.6
30	E	6	Z Man's Revenge	100	200	50.0%	50	0.2
40	E	6	Purgatory	540	1240	43.5%	100	2.8
41	E	6	West Ridge	1520	3000	50.7%	81	5.6
45	E	6	Angel Face	520	1000	52.0%	164	3.8
47	E	6	East Bowl	1100	3000	36.7%	350	24.1
48	E	6	West Bowl	1340	2600	51.5%	845	50.4
50	E	6	Far East	600	1144	52.4%	120	3.2
65	E	6	"Go Big"	480	880	54.5%	120	2.4
			<b>Totals, averages</b>	<b>22710</b>	<b>81106</b>	<b>28.0%</b>	<b>129</b>	<b>240.1</b>
<b>Trails Approved but not yet constructed</b>								
59*	P	1	Snow Pit	120	550	21.8%	150	1.9
69*	P	1	Upper PT 6	240	1230	19.5%	120	3.4
73*	P	1	E Upper PT 6	190	1180	16.1%	120	3.3
71	P	3	SW Spartan	120	440	27.3%	150	1.5
61*	P	4	Sunshine East D	420	968	43.4%	150	3.3
68*	P	4	Lowel PT 6	240	616	39.0%	120	1.7
70	P	4	W Spartan	344	880	39.1%	140	2.8
58*	P	4	LaValle D	480	1232	39.0%	100	2.8
51	P	4	Paradise Alt. C	600	1420	42.3%	120	3.9
45E	P	5	Angelface Ext.	120	370	32.4%	150	1.3
52	P	6	W. Side Y Alt. C	1160	2250	51.6%	100	5.2
56	P	6	Purg.II Longhorn	440	800	55.0%	100	1.8
64	P	6	South Griz Cutoff	520	792	65.7%	120	2.2
			<b>Totals, averages</b>	<b>48894</b>	<b>161766</b>	<b>30.2%</b>	<b>9</b>	<b>35.1</b>
			<b>Totals, averages</b>	<b>71604</b>	<b>242872</b>	<b>29.5%</b>	<b>49</b>	<b>275.2</b>
North LaValle Trails *, Trails 60 & 62 constructed Oct 01							by Alpentech, Inc.	

## **Specialized Skiing Terrain and Competitive Snow Sports Venues**

Over the last 10 years Sunrise Bowl (# 22) has developed into an outstanding snow sports venue. Proximity to the base area, dedicated lift (T-bar), snowmaking, night lighting and suitable terrain have made Snowbowl a popular venue with competitors, coaches, officials and parents. Sunrise Bowl has USSA homologated slalom, freestyle mogul and aerial venues (there are only a handful of homologated aerial sites in the country). The quality of this site was demonstrated in March of 2003, when Snowbowl was able to host the US Freestyle Championships after being chosen as a last minute substitute (in February). While Sunrise Bowl is a great asset for competitors of all ages, during events Sunrise Bowl needs to be closed to the general skiing public resulting in a loss of half of the lower level terrain at the base and considerable congestion on the remaining lower level slopes. Snowbowl has tried terrain parks on Sunrise Bowl but because of the other uses of this area and skier congestion, it would be impractical to permanently construct a terrain park in this location.

## **4d. Existing Skier Service Facilities**

### **Existing Buildings**

There are three main buildings used for skier services at the base of Snowbowl. This includes the Snowbowl Lodge, a day lodge that was constructed in 1961 and remodeled in 1997. The Gelandesprung Lodge, built in 1996/97 which has a small hotel/hostel on the upper two floors and the ski rental shop on the lower floor. The third, the Last Run Inn, is a bar/restaurant extensively remodeled and expanded in 1999. The Snowbowl Lodge contains a cafeteria/restaurant, ski school, ticket office, eating, changing facilities, restrooms and ski patrol. As part of the design and subsequent permitting of these projects by the Montana Building Department of these construction projects, these building are ADA compliant. There is additional office space, as well as employee housing in the Nila Lodge. On mountain is the Grizzly Chalet, an A-frame building built in 1962 that has limited food service, electricity but no running water. There is a modern outhouse nearby.

**Table 9 Existing Skier Service Buildings**

	FACILITY sq ft (* on Forest land)						Current Totals	1996 Plan Totals
	Snowbowl Lodge	Last Run Inn	Grizzly Chalet**	Gelandesp Lodge	Nila Lodge	Warming Hut* BigSkyMt		
TYPE OF USE								
Restaurant Seating (sq ft)	2050	2200	860				5110	5060
Seats	163	159	40				362	388
Seating cap. @ 4.5 turn							1629	1746
Outdoor (sq ft)		900						
Restrooms								
Men's Toilets	3	1					4	5
Urinals	4	3					7	8
Sinks	2	2					4	5
Women's Toilets	6	4	1				11	12
Sinks	3	3					6	7
Ski rental and retail				1800			1800	2000
Other Skier Services	3200	1070	60			300	4630	6110
Other Administrative	550	100	500	200	1100		2450	1600
Total for building	5800	3370	1420	2000	1100	300		
TOTAL w/o guest rooms							13990	14770
Guest Rooms				4000				
TOTAL SPACE							13990 <sup>1</sup>	14770 <sup>1</sup>

\* Grizzly Chalet and the Warming Hut are on National Forest land, all others on private land

1. Totals do not include guest rooms

The existing space by use and facility is summarized in Table 9 and compared to the space needed with the completion of the 1996 plan. The space requirements were calculated based on experience at Snowbowl, as well as review of other ski industry and Forest Service data. A seat turnover rate of 4.5 has been utilized (5 times was used in the 1996 Plan. This compares to a general rate of 3 to 5 times used in the industry). Turnover rate of 4.5 is appropriate for Snowbowl because a number of skiers ski part of the day (season pass holders and half day tickets) and outdoor seating is not included. The restroom requirements are modified slightly from other industry standards (Snow Engineering standards in “Red Lodge Mountain Ski Area Masterplan, 1993”) to coincide with experience that has been noted over the last 20 years at Snowbowl (more urinals and fewer toilets for men).

### Access and Parking

Snowbowl is 12 miles from Missoula with access via Grant Creek Road and Snowbowl Road. From the I-90 interchange (exit 101), the route consists of Grant Creek Road, which is paved, for 4 miles, then 6 miles on Snowbowl Road, the initial part paved and the last 5.5 miles gravel and

native material. Grant Creek Rd and the first mile of Snowbowl Rd. are maintained and under the jurisdiction of Missoula County. The last 5 miles of Snowbowl Rd, also known as Forest Rd #698, is under the jurisdiction of the Forest Service and is jointly maintained by Snowbowl and the Forest Service, with winter maintenance by Snowbowl and summer maintenance by the Forest Service. As part of the approved 1996 Plan, addition of lifts and trails that could increase traffic and congestion on Snowbowl Road 698 are delayed until this road is improved. Please see the “Discussion of the 1996 Plan” and “Parking and Access” in the “Proposed Improvements” section of this plan for more information. Snowbowl is currently in the process of widening Forest Rd #698.

Parking facilities are located on the terminal part of the road and the parking lot at the base. Following modest expansion of the parking lot in 1999, the parking capacity was 560 vehicles (based on actual count and with supervised parking). At the ratio of 2.5 skiers per car (Snow Engineering in “Red Lodge Mountain Ski Area Masterplan, 1993”, used 2.7 and The Sear-Brown Group in “Lost Trail Ski Area Master Development Plan, 1996”, used 2.8 skiers per car) this would give a capacity of 1,400 skiers. During the summer of 2003, phase I of the Snowbowl Rd improvement was completed adding approximately 150 spaces (with supervised parking). Snowbowl has also purchased an off site parking lot of approximately 4 acres at the base of Grant Creek (next to the Sevenar store).

Snowbowl operates a shuttle bus service on weekends and holidays. Currently up to two buses are making one trip per day (morning pick up and afternoon return) with three pick up/ return locations in Missoula. For planning purposes a capacity of 40 passengers per bus has been used or a current capacity of 80 skiers a day for Snowbowl’s bus service (Snow Engineering in “Red Lodge Mountain Ski Area Masterplan, 1993”, used 44). Actual passenger counts confirm 80 plus passengers using the bus service on busy days with an average passenger count of 31 per bus over the main part of the season.

#### **4e. Existing Infrastructure**

##### **Snow Making**

The existing snow making system at Snowbowl, developed over the last 10 years, has proven to be particularly valuable in the lower elevations both for early season snow coverage and maintaining snow coverage in the later season. The snow making system is nearly completely built out based on the 1996 Plan. It includes snow making capabilities on all the intermediate and beginner terrain below 6,500 feet except for Huckleberry (run # 66). This includes lower Paradise #36, Longhorn #39, the Bowl Out run #46, Rope tow #29, Sunrise Bowl #23 & #24, Spartan #16 & #17 and the base area. Water is supplied from two sources at the base, a surface source (Draft Certificate of Water Right #76M-89451) and a well (Certificate of Water Right #84571-G76M). These water rights allow for total of 115 gallons per minute from both these sources up to 28-acre feet in total usage per ski season (October 1<sup>st</sup> to April 1<sup>st</sup>). Water is stored in two reservoirs. One is approximately 2 million gallons capacity at the Spartan Saddle (elevation 6,500 feet), and the second at the base area, is approximately 400,000 gallons. Pumps fill these reservoirs and the snow making system itself is operated by gravity flow from the Spartan Saddle reservoir. This has resulted in a very energy efficient system. The reservoirs are filled at approximately 100 gallons per minute, but water can be released at over 1,000 gallons

per minute when snowmaking conditions are suitable. The snow guns in use are the fan type, which are highly energy efficient as well, utilizing no piped compressed air, but only water and electricity. During the 2000-2001 season a new type of gun, “water sticks” were added which take advantage of the high-pressure water available to make snow without use of fans or electricity.

### **Grooming Equipment**

Snowbowl’s grooming fleet consists of four grooming vehicles (two LMC 3700’s and two Bombardier 2000’s). All four are equipped with tillers. Currently Snowbowl grooms approximately 80 acres of terrain per night, running three vehicles one shift each. This is more than adequate as industry standards are approximately 45 acres per grooming vehicle.

### **Existing Electrical Power**

Electrical power for the base area as well as throughout the mountain is more than adequate for current needs as well as projected uses and is supplied through Northwestern Energy.

### **Existing Water Supply**

Water for domestic use is supplied from spring/surface water source. It is approved by the State of Montana “Public Water System #844” and has adequate capacity for current and projected needs.

### **Wastewater Treatment**

Wastewater is handled through a series of septic systems with conventional drain fields located in the base area on private land. The existing systems were evaluated and re-approved in 1996 by Missoula County Health Department when the Gelandesprung Lodge was built. An additional system, approved in 1996 by the State Health Department was added for the Gelandesprung Lodge.

## **4f. Existing Summer Use and Facilities**

Snowbowl has had an active summer operation since 1987. The resort is open Fridays, Saturdays and Sundays from late June until mid September offering chairlift rides, mountain biking, golf (disk golf), hiking, sight seeing with food and refreshments served at the Last Run Inn. During the summer of 2001, a five-mile single-track mountain bike trail was constructed from the top of the Grizzly lift through the Bowls crossing runs #41, #48, #47, #42; to Longhorn #39, Paradise #36 and back to the base.

## 5. Skier Market Analysis

Although Snowbowl is seeing more skiers from the regional and even national markets it is still primarily a day ski area serving Western Montana, particularly Missoula County. Following the approach to market analysis developed by Robert Brandenberger in his “Montana Snowbowl Development Plan Alternatives” of April ’92, Snowbowl’s primary base market would be comprised of the population of skiers living closer to Snowbowl (and Marshall) than the out of town areas, or less than a one-hour driving time. Table 10 lists the counties and their population that meets this criterion. These counties have had strong population growth over the last ten years and are projected to continue that growth over the next ten.

**Table 10 Missoula Day Use Skier Base**

County	POPULATION (2)			%Change 1990-00	%Change 2000-10	BASE POPULATION (1)		
	1990	2000	2010			% (1)	2000	2010
Missoula	78,687	91,010	103,710	16	14	100	91,010	103,710
Ravalli	25,010	36,870	45,980	47	25	50	18,435	22,990
Mineral	3,315	3,770	4,060	14	8	50	1,885	2,030
Lake	21,041	26,480	31,190	26	18	33.3	8,818	10,386
Sanders	8,669	10,380	11,690	20	13	33.3	3,457	3,893
<b>TOTALS</b>	<b>138,712</b>	<b>170,510</b>	<b>198,640</b>	<b>23</b>	<b>17</b>		<b>125,604</b>	<b>145,018</b>

- (1) Base population: population closer to Snowbowl/Marshall than out of town areas, generally less than one hour driving time.
- (2) Source: Montana Department of Commerce

Table 10 also shows these population changes and the total base populations for the census year, 2000 and projected population for 2010. Using this estimate, the base population for the year 2000 is approximately 126,000 people. Market studies in areas similar to Western Montana have found a range of 8%–11% of the population ski a frequency 9–12 times a year. In other words, from this base population in the year of 2000 you would reasonably expect the Missoula skier market to be approximately 126,000 skier visits. However this number of skier visits is not being seen (see Table 11 Missoula Skier Market).

Table 11 Missoula Skier Market

	Snowbowl				Marshall	Missoula Skier Market
	Total Visits	Operating Days*	Average Daily visits	% Utilization @1200 CC		
3 Yr Av.00-03	60,300	103	564	47%	25,967	86,267
02-03	54,000	98	551	46%	14,200	68,200
01-02	68,800	119	578	48%	33,500	102,300
00-01	58,100	104	559	47%	30,200	88,300
99-00	64,800	113	573	48%	26,000	90,800
98-99	66,100	115	575	48%	23,100	89,200
97-98	47,100	104	453	38%	16,100	63,200
96-97	62,300	110	566	47%	25,800	88,100
95-96	47,400	99	479	40%	15,800	63,200
94-95	45,900	95	483	40%	15,600	61,500
93-94	44,600	86	519	43%	20,900	65,500
92-93	55,100	98	562	47%	9,100	64,200
3 Yr Av.	43,667	92	475	40%	20,467	64,133
91-92	47,100	89	529	44%	17,100	64,200
90-91	46,700	100	467	39%	20,600	67,300
89-90	37,200	87	428	36%	23,700	60,900
% Change 00-03	3.81%				2.69%	3.45%

\*For the seasons 00-01 and 02-03; 9 and 15 days respectively, at the start of the season are not included because only the T-bar was open (on man made snow) and Snowbowl operated at 100% of available capacity during these days.

For example, for the season 1999-2000, the total Missoula skier market (the sum of Snowbowl's and Marshall's skier visits) was 90,800, 28% less than the projected number of 125,604 skier visits based on the population in the Missoula day use skier base (Table 10). Even in the 01-02 season when both Marshall and Snowbowl had record years with visits totaling 102,300 there was a 21% gap from the projected 129,875 visits (125,604 plus 2 years average growth). As Bob Brandenberger pointed out in his study, the reasons for this are probably either the primary local market is exporting more skier visits than are being received from the outside, or 2), the frequency of skiing is less than possible.

Further analyzing these reasons the first question to ask, is there suitable skiing capacity to offer these skiers? Overall skier visits at Snowbowl appear to have steadily increased during the last

14 years. The 3-year average skier visits from 89-92 compared to 3 year 00-03 shows an average annual increase of 3.8%. However, looking at the average daily visits, it is somewhat different situation. Over the last five ski seasons the average daily visits have flattened out at about 565 skiers per day while the increase in annual skier visits has varied based on the number of operating days. This is an indication that Snowbowl is operating at capacity. Another way to evaluate this is to compare the average daily skier visits to Snowbowl's comfortable daily capacity to get an annual utilization percentage. This calculation is shown on Table 11 based on a comfortable daily capacity of 1200 skiers at one time (please see capacity discussion on page 7 for the explanation of capacity and why 1200 skiers at one time was used). Utilization is a measure of capacity that's used in the ski industry that compares the comfortable daily capacity or skiers at one-time "SAOT" to the average skier visits. According to the National Ski Area Association, ski areas in the Northern Rocky Region average around 30%. It can be seen that Snowbowl is well above this average and averaging 48% for the last five seasons, another indication that Snowbowl is at capacity. Notable is that this utilization has remained high even with substantial expansion at other local resorts, an indication that Snowbowl is the first choice for many skiers even with the weaknesses it has.

The other ski area in the Missoula skier market is Marshall Mountain. As Bob Brandenberger noted in his review, Snowbowl and Marshall compete and complement each other for the local market. Marshall, having night skiing, and predominantly novice and intermediate trails, while Snowbowl has a greater vertical rise, longer runs and steeper slopes that attract more advanced skiers. From a review of Marshall's skier visits it appears that it is not able to pick up more of the skiers in the Missoula market. Although all the reasons for this are not known there have been serious operating problems in the last few years and at this time Marshall Mountain may be closed. This plan was developed and projections were made assuming that Marshall Ski Area would continue to operate. Marshall not opening will make the capacity situation much worse. Indeed, as can be seen from the Table 10, by 2010, the projected population in the Missoula ski market could create a theoretical demand of 145,000 skier visits, which is considerably more than the current capacity of Snowbowl and Marshall.

One of Snowbowl's strengths has always been its' greater vertical drop, long runs and challenging terrain, advanced terrain comparable to any national destination resort. This terrain is a strong draw for Snowbowl and differentiates it from its competitors. In addition the demand for more advanced trails is increasing as improvements in ski and grooming technology have made this terrain skiable by more people. Another plus is that Missoula is an attractive gateway for regional visits. There are an abundance of hotel beds under utilized in the winter, numerous restaurants and other services. Transportation is good via Interstate 90 and the Missoula International airport. Although the primary market for Snowbowl is the Missoula vicinity, with development of lower level terrain – intermediate and beginner trails, to round out the trail mix, Snowbowl would attract more skiers from in the regional market.

The access road, Snowbowl Road, is one of the primary reasons skiers give why they, their friends or family do not ski at Snowbowl and either ski else where or not at all. This is confirmed in marketing surveys and frequently mentioned by Missoulians. Snowbowl Road doesn't meet the design standards for Average Daily Traffic, (as described in the 1996 Development Plan EA) Many local schools (Missoula School District 1) do not use Snowbowl for school sponsored ski P.E. because of the road. Construction on the road started in 2003 and

completion is scheduled for 2005. There will be an immediate need for additional capacity when the road is finished.

The local and regional skier areas are listed in Table 12 with their basic statistics. Other ski areas in Snowbowl’s market don’t have as great a vertical rise as Snowbowl and are at least two hours’ drive away; however, Snowbowl’s two main weaknesses have been a relative shortage of lower level terrain and the access road. These facts have been confirmed in marketing studies as well as commonly mentioned. Snowbowl to some is not “family friendly” because not everyone in the family (or other mixed group) can find suitable terrain. Where as Snowbowl has not been able to add any new lifts or significant terrain in the last eight years, several of the other local areas have. Discovery, Lookout Pass and Lost Trail have added chair lifts and more terrain and Blacktail opened in this time period. Snowbowl needs to provide a wider range of skier opportunity (especially beginner and intermediate terrain) and associated infrastructure improvements to stay competitive and to meet the growing skier demand in its immediate vicinity.

**Table 12 Snowbowl And Competitors (for winter 2003-2004)**

<b>Local</b>	<b>Vertical Feet</b>	<b>Longest Run Miles</b>	<b>Chairlifts</b>	<b>Surface Lifts</b>	<b>Adult Lift Ticket</b>	<b>Distance From Missoula</b>
Snowbowl	2,600	3	2	2	\$32.00	12
Marshall	1,500	2	1	2	?	7
Discovery	1,300	1.5	6	0	\$28.00	100
Lost Trail	1,200	1	4 <sup>(1)</sup>	3	\$24.00	95
Lookout Pass	850	1	1 <sup>(1)</sup>	1	\$22.00	105
Blacktail	1440		3	2	\$30.00	100
<b>Regional</b>						
Big Mtn.	2,500	2.5	8 (2DT)	3	\$49.00	140
Big Sky	4,180 <sup>(2)</sup>	3	1 G, 1 T +13 (3DT)	4	\$59.00	240
Schweitzer	2,400	2.7	6 (1DT)	-	\$44.00	200
Silver Mtn.	2,200	2	4 <sup>(3)</sup>	-	\$35.00	130

(1) Lost Trail and Lookout each installed another chairlift summer of 2003

(2) Not continuous vertical

(3) Also gondola used only for access

DT: Detachable, High Speed Chair, Quad; G: Gondola; T: Tram

Sources: “Montana Winter Guide” by Travel Montana; www.schweitzer.com; www.silvermt.com

## 6. PROPOSED IMPROVEMENTS

### 6a. Discussion Of The 1996 Development Plan

The goals of the 1996 plan (decision notice of April 1996) were to

1. Expand ski opportunity and distribution in the permit area, specifically increasing the amount of beginner and intermediate skier opportunity or terrain and making it more enjoyable for people who ski at this level.
2. Reduce skier congestion on the LaValle chair lift.
3. Improve public safety on Snowbowl road.

To help fund the improvements and to keep Snowbowl competitive, some of the projects were permitted prior to the improvement of the Snowbowl Road. These have been completed (except trail #51) and were primarily run improvements and snow making. The road improvement has begun and is about 25% completed at this time. The congestion at the LaValle lift continues to be a problem. One of the key premises of the 1996 plan was to try to expand the skier opportunity and increase the number of lower ability level terrain while maintaining or minimally expanding the permit boundary. During the planning process all the terrain within the existing permit area was carefully evaluated. The only lower ability level terrain identified was on the north side of Hot Fudge (North LaValle Creek) and to the west of Upper Spartan. Lift location and run development was planned to maximally utilize this very limited terrain. Expansion to TV Mountain was considered during the preparation of the 1996 plan but was not included because the size of the project and the requirement for significant change in the permit boundaries.

Over the last several ski seasons since the approval of the 1996 plan, the trails and the lift that were proposed in that plan have been reevaluated. There are some significant shortcomings of some of the remaining projects.

1. While the terrain at North LaValle is good for novice and lower intermediate skiers, its location is not. It is a long distance from the base requiring three lift rides to reach it. The estimated time it would take a novice skier to get to North LaValle is over 40 minutes. The usual location for beginner terrain is closest to a base area, as beginning skiers frequently get tired (especially children) and like to take breaks to rest and warm up. Making a trip up to the North LaValle area and back at the end of the day would be a considerable amount of skiing for a beginner or novice skier.
2. The High Roller lift is a long lift and would require a ride time of 13 minutes (with a fixed grip lift, the only financially feasible type of lift in Snowbowl's situation. In much larger ski areas, this would be handled with a detachable lift, which would decrease the ride time to 7 minutes). The runs north west of Upper Spartan would be the only new terrain to be opened up by this lift, so most skiers would be using this lift as a transport lift or a supplemental lift to the LaValle lift to get to the top of the mountain. It would be a second choice for skiers as the ride time would be considerably longer, 13 minutes versus the 7 minutes on the LaValle lift. The plan did call for an intermediate loading

area that would shorten the ride time from the Grizzly Lift to the top to 8 minutes but mid-way loading lifts are more difficult to operate and more complicated for skiers to use. The new lift would also terminate close to the current LaValle lift in an area that is congested with skier traffic and radio transmission facilities. An unloading area at this location could aggravate the situation.

3. While the capacity of the ski area is increased to approximately 1,800 skiers at one time, SAOT, this would not be enough increase in capacity to fund the needed improvements, especially the road improvement.
4. Future anticipated demand (from the time of writing this document-2003) is not addressed. Capacity of 1800 SAOT, skiers at one time, is close to the current demand (as of 2003) and there is no contingency for future growth beyond 1800 SAOT.

## **6b. Proposal Summary**

Besides the reservations noted about the 1996 plan, this proposal's upgrades and expansions are driven by the need to meet the growing demand for year round (skiing and other mountain) recreation at Snowbowl, to better balance ski terrain mix and to produce the financial resources to meet the requirements of the road improvements as well as the other improvements to the resort. These improvements represent the best use of the resources to accomplish Snowbowl's goals within the management objectives of the Forest Service.

This master development plan is based on the review of Snowbowl operations, challenges and opportunities by Snowbowl management and ski area consultants over the last several years. The proposal is expansion of Snowbowl to incorporate TV Mountain into the ski area boundary and to delay or modify most of the remaining projects of the 1996 plan.

When completed, on TV Mountain there will be three new lifts, 20 new ski trails and two new skier service buildings. The permit boundary would be extended and the Special Use Permit increased to include 1,088 additional acres. Total acreage will be 2,306 of which 2,226 will be under Special Use Permit and 80 acres private land. From the 1996 plan, the North LaValle T-bar ("L" lift) and most of the related runs would be delayed until the projects on TV Mountain were completed and skier demand warranted development at North LaValle. The High Roller chairlift would be modified (it is the "A" lift between TV Mountain and the current area) and runs related to the High Roller lifts would be modified. Of the other ski trails in the 1996 plan, a few would be completed with the TV Mountain expansion and the remaining would be delayed. A third new skier service building would be constructed in the base area. All these projects would follow the improvement to the Snowbowl Road 698.

The major parts of the proposed plan are listed in Table 13 on the next page.

**Table 13 Proposal Summary**

Location	New Lifts		New Ski Trails	New Buildings	Resort Area	
	Chair lifts	Surface lifts			Sp Use Permit	Private
On TV Mountain	2	1	20	2	1088 new	0
Approved/not constructed	1	1	13		1138 exist	
At Snowbowl base				1	0	80
<b>TOTALS</b>	<b>3</b>	<b>2</b>	<b>33</b>	<b>3</b>	<b>2226</b>	<b>80</b>

**6c. Construction and Mitigation**

TV Mountain has been developed over the years in several ways. It was the site of the original Snow Park Ski Area in the 50's and it is currently a Forest Service designated electronic site for the Missoula TV stations (Access to the TV Mountain Site would be improved with either over groomed snow trails or via chairlift) There have also several recent timber sales. The trail location and related construction would utilize existing clear cuts from past timber sales as much as possible. The ski area boundary would be offset from LaValle Creek 100 feet to protect the stream area. Ski runs would be constructed with a minimal grading and there's no grading anticipated for trails other than correcting minimal adverse grades. Some grading may be required for the location of the T-bar at the Spartan saddle (to correct steep cut and fill slopes where the Point Six road switch back is). All slope and trail clearing will be in accordance with Lolo National Forest standards stressing minimal soil disturbance and immediate revegetation. Trees would be flush cut to the ground and stumps would be left in place except on slopes with a low pitch that are to be used by lower ability level skiers. On these slopes, located on the southwest portion of TV Mountain, stumps would be removed to allow grooming and skiing on less snow pack. Snowbowl will develop a vegetation management plan in cooperation with the Forest Service to revegetated soil disturbances, control weeds, promote forest health and remove hazard trees. Best Management Practices "BMP's" will be followed for silt and sedimentation reduction and culvert installation. Visual quality and objectives will be met for trail design and location. The National Ski Areas Association (<http://www.nsaa.org/>) has developed the Sustainable Slopes Program which is a voluntary program to address short and long-term environmental impacts of construction and operation of ski areas. Snowbowl is a charter member of the Sustainable Slopes Program and uses the applicable principles and suggested "Options for getting there" in guiding the current operation, developing this plan and will continue to in future construction and operation of the expanded ski area.

**6d. Proposed Lifts**

Five lifts are included in this plan. Two newly proposed chairlifts for TV Mountain ("B"&"C"), one newly proposed surface lift for the summit of TV Mountain ("D"), one modified chairlift ("A") from the 1996 plan and the north LaValle t-bar ("L") from the 1996 plan. The existing and proposed lifts are listed in Table 14 and specific details follow. Adequate power is already in place for all proposed lifts either at the top of TV Mountain (B, C & D) or at the top of the current Grizzly Lift (A).

**Table 14** Existing and Proposed Lifts

Name	Type	Slope Length Ft	Vertical Rise Ft	Hourly Capacity Person/Hr	Ride Time minutes	Vertical Transport Feet (000)	SAOT
<b>Existing Lifts</b>							
Grizzly Chair	Double	5350	1970	1150	11	2266	764
LaValle Chair	Double	3250	972	1200	7	1166	465
Sunrise	T-Bar	1476	508	811	3	412	123
Beginner Tow	Rope	500	70	900	1	63	56
<i>TOTAL EXISTING</i>				4061		3907	1408
<b>Proposed Lifts</b>							
“A” Chair lift	Double	3910	860	800	9	688	74
“B” Chair lift	Double	4900	1440	1200	11	1728	538
“C” Chair	Double	3860	1810	800	9	1448	282
“D” Tow	Rope	800	130	600	2	78	43
“L” North LaValle	T-Bar	1000	300	500	2	150	37
<i>TOTAL PROPOSED</i>				3900		3942	974
<i>GRAND TOTAL</i>				7961		7849	2382
<b>Options</b>							
“A <sup>1</sup> ” Lift	T-Bar	1620	360	800	4	288	31

### 1) West TV Mountain Lift “B”

The West TV Mountain lift (“B” lift) will be the major lift serving the terrain on TV Mountain and is located to provide maximum amount of lower level terrain. This lift will extend from the southwest corner of the ski area boundary, at an elevation of approximately 5,440 feet and extend to the top of TV Mountain at 6,790 feet. Access to the lift will be provided by two glide paths, a northern one leading from the LaValle area and a southern from the south edge of the TV Mountain development. The lower lift terminal will be located on the existing road and will require minimal excavation for placement. The upper terminal will be located in the south portion of the summit of TV Mountain so it doesn’t interfere with existing transmission facilities. The West TV Mountain lift will be a rebuilt lift and its exact specifications would depend on what lift is available. General specifications would be double fixed grip chair lift with a capacity of 800-1,200 skiers per hour, a slope distance of 5,100 feet and a ride time of approximately 11 minutes. Total vertical would be 1,350 feet.

### 2) East TV Mountain Lift “C”

The East TV Mountain lift (“C” lift) would rise out of the current Snowbowl base and extend to the summit of TV Mountain. It would provide access to all the runs on TV Mountain from the summit and primary access to the runs on the east side of TV Mountain. The East TV Mountain lift a would also serve as a “back up” for the Grizzly lift with access to the top of the Grizzly lift from TV Mountain via the Spartan Saddle (“A”)lift. The East TV Mountain lift lower terminal would be at an elevation of 4,980, with a top elevation of 6,790 and a total vertical rise of 1,810 feet. The “C” lift would be designed for downloading so that lower level skiers could ride this lift to the top, ski D1 and other easier runs on TV Mountain, use the skier facilities on the summit and then take the “C” lift back down at the end of the day. It’s possible that this lift may

be a “pulse lift” to provide all weather access to the top of TV Mountain year round. On a pulse lift the passenger carriers are grouped together and permanently attached to the hauling cable. The lift is slowed or stopped when each group of carriers reaches a station, making it easier for pedestrians to load and unload. A pulse lift has some of features of a high speed detachable lift including slower loading speed and the potential to use enclosed carriers like gondolas but because the pulse lift is mechanically simpler than a detachable lift and less expensive, it may be economically feasible for Snowbowl. The trade off is that a pulse lift has less capacity than a high-speed detachable lift. The exact specifications of this lift and whether it would be a pulse lift would depend on the availability of a suitable lift in the used lift market. It’s anticipated that the capacity of this lift would be between 600-1,200 persons per hour. The East TV Mountain lift is an integral part of the TV Mountain system because it will allow easy and fast access (9 minute ride time) to beginner/novice terrain on TV Mountain. The East TV Mountain “C” lift would be installed as soon as possible after the “B” lift. To more efficiently use base area space and to better organize skier traffic the lower terminal of this lift could be incorporated into the new building scheduled for the base area.

### **3) Spartan Saddle Lift “A” or “A<sup>1</sup>”**

Spartan Saddle lift (“A” or “A<sup>1</sup>” lifts) is primarily a transport lift to bring skiers from TV Mountain pod to the top of the Grizzly lift to access the ski terrain of the existing ski area. Two lift options are proposed for this. The most direct and simplest solution is a surface lift or T-bar at the Spartan Saddle itself. The T-bar option is shown on the map as “A<sup>1</sup>”. This lift would have a horizontal distance of 1,620 feet and a vertical rise of 360 feet. One disadvantage of this option is that the only access from TV Mountain is on trail B112 which does not have sufficient pitch to ski all the way to the lift, requiring some polling across the flats of the Spartan Saddle. The second option is a chairlift running from the existing switchback off the Point 6 road at elevation 5,930 feet extending to 6,970 feet. The chairlift option (“A”) would allow more terrain to be opened north of the Spartan Saddle. Although the terrain is limited it is desirable north-facing slopes and would significantly add to the variety of terrain at Snowbowl as well as being easier and more comfortable to ride compared to the T-bar. The Spartan Saddle chairlift represents a modified High Roller lift approved in the 1996 Plan. Compared to the High Roller lift, the lower terminal would be placed at a somewhat lower elevation (on the old Point 6 road switchback) and the upper terminal near the proposed mid-way location of the High Roller lift.

### **4) TV Mountain Summit Surface Lift “D”**

A surface lift at the summit of TV Mountain (“D” lift) would take advantage of the novice terrain here and proposed skier service facilities. It would be an excellent second ski school location. The lift would probably be a rope tow starting at elevation of 6660 and going to the summit at 6970, for vertical rise of 130 feet and distance of 800 feet. This lift would be installed early in the project.

### **5) North LaValle T-Bar “L”**

North LaValle T-bar (“L” lift) and associated ski trails were approved in the 1996 plan. The terrain on TV Mountain is a much better solution to reach Snowbowl’s immediate goals than that off of the North LaValle area (see 6a Discussion of the 1996 Plan). Because of this most of the

North LaValle area expansion is shown on this plan as delayed until the completion of the TV Mountain expansion and probably would be dropped if this TV Mountain plan is approved.

## **6e. Ski Trails**

### **TV Mountain Proposed Runs**

Twenty new ski trails are proposed on TV Mountain. The ski trails will make maximum use of the existing clear cuts, previous timber sale units and existing roads. Out of a total of 166 acres of open ski trails, 70 acres would be in existing cleared areas and 96 acres would be new cleared area. There will be 360 degrees of skiing off the summit of TV Mountain with access to the summit via lifts B and C. Skier circulation around TV Mountain will be on a set of glide paths ringing the lower mountain. Trail 101 provides a route from the north to the base of lift B, while Trail 118 accesses from the south and Trail B8 will join Lower Second Thought (57) giving lower ability level skiers a route to the Snowbowl base. Trail B112 would lead from the top of TV Mountain to the Spartan Saddle. Trails on the north portion of TV Mountain would include a new trail B2 as well as B3 which is on the existing clear-cut. These would end in trail B1, the glide path to the bottom of the west TV Mountain lift until the Spartan Saddle "A" chairlift was constructed. With the installation of chairlift A, trails B2 and B3 would be extended to the base of chairlift A. Other runs on the north side would be tree skiing. Trail D1 at the summit has excellent teaching and beginner terrain. Those on the west and southwest of TV Mountain would be intermediate pitch and have a variety of configurations for interest including a gladed trail. Interest is also added by curving the trails to follow the slight changes in the fall line and other variations in the topography. Trails on east TV Mountain are the most advanced terrain with open trails (C2 and C30) and tree skiing. This terrain on the north and east sides will offer expert skiers the type of terrain that is similar to the "off area" terrain now used and will take pressure off some of the more sensitive areas (like the Rattlesnake Wilderness). The trails on the southeastern portion will hook up with the existing ski trails off Sunrise Bowl and those on the northeast go to Spartan Headwall. These trails will provide advanced skiers a route to the base area and will provide excellent snow conditions being east facing. All the "B" trails would be groomable. While the actual grooming frequency and priority of each trail would depend on skier demand and snow conditions, the access trails B1, B116, B117, B118, B8, B9 (and B3 after the "A" lift opened) would be groomed more frequently. The remaining "B" trails would be groomed to provide variety and progression of difficulty (similar to the LaValle area). Trail D1 would also be groomed frequently where as the "C" trails would not be groomed.

The 166 acres of new terrain on TV Mountain will result in 36.4 acres of beginner-novice-lower intermediate trails; 89 acres of intermediate-high intermediate trails; and 41 acres of advanced-expert trails. Table 15 summarizes the breakdown into the three basic ability groups (individual trail specifications and ability levels are shown in table 14 on page 26). Acreage, resulting capacity and percentage of the total TV Mountain terrain are shown on the right of the table. It can be seen that the new terrain on TV Mountain is weighted towards the lower ability levels.

**Table 15** Proposed Ski Terrain on TV Mountain

Ability Level	Level	Area in acres	Guideline for Skier density Skiers/acre	Calculated SAOT	% Total SAOT	Skier Market Mix %
Beginner, Novice and Lower Interm.	0, 1 and 2	36.4	15	546	35	30
Intermediate and High Intermediate	3 and 4	89	10	890	57	45
Advanced and Expert	5 and 6	41	3(5 groomed)	123	8	25

Total

1559

Table 16 displays the same information but for the entire resort including the existing, approved and proposed trails. There is a significant and desirable shift in the trail mix with the addition of the TV Mountain trails, bringing the total resort capacity mix to 29 % beginner-novice-lower intermediate; 54 % intermediate-high intermediate; 17 % advanced-expert. The terrain mix is now much closer to the skier market mix than the current mix (Appendix B summarizes these differences).

**Table 16** New Total Resort Terrain Distribution: Existing, Approved and Proposed

Ability Level	Level	Area in acres	Guideline for Skier density Skiers/acre	Calculated SAOT	% Total SAOT	Skier Market Mix %
Beginner, Novice and Lower Interm.	0, 1 and 2	64.2	15	968	29	30
Intermediate and High Intermediate	3 and 4	184	10	1847	54	45
Advanced and Expert	5 and 6	193	3(5 groomed)	577	17	25

Total

3392

On the next page three tables summarize the ski trail statistics. Table 17 (top of the next page) shows a summary of the current and approved terrain summarized by ability level. Table 18 (center of page) then lists the specifications of the proposed trails for TV Mountain and terrain acres distribution by ability levels. Table 18 also lists the new total resort terrain distribution by acreage and SAOT by the three basic ability levels. Table 19 (bottom of page) shows a summary of existing, approved and proposed terrain SAOT by three ability levels

<b>Table 17 Existing and Approved Winter Trail Summary</b>															
Source: Existing and approved trail data from Snowbowl, new trails from Alpentech drawing															
Type	Vert. ft	Hoirz. ft	Slope	Avg Width	Ex & Ap Acres	Existing & Approved Acres per Ability Level									
						Level	0	1	2	3	4	5	6		
Beginner	70	500	14.0%	70	0.8	0	0.8								
Novice	2450	19524	12.9%	72	12.5	1		12.5							
Low Intermediate.	1060	3640	29.1%	155	14.9	2			14.9						
Intermediate	4444	17196	25.8%	117	34.1	3				34.1					
High Intermiate.	12984	49754	26.1%	101	61.1	4					61.1				
Advanced	5800	17646	32.9%	133	43.9	5						43.9			
Expert	9440	19086	49.5%	185	107.9	6									107.9
<b>Total Existing &amp; Apprd</b>	<b>36248</b>	<b>127346</b>	<b>28.5%</b>	<b>94</b>	<b>275.2</b>			<b>0.3%</b>	<b>5%</b>	<b>5%</b>	<b>12%</b>	<b>22%</b>	<b>16%</b>	<b>39%</b>	
<b>Existing and Approved SAOT</b>					<b>1830</b>				<b>423</b>		<b>952</b>		<b>455</b>		

<b>Table 18 Proposed Winter Trail Specifications</b>																
ID	From	To	Vert. ft.	Horiz. ft.	Avg. Slope	Avg avg.Width	Prop. Acres	Proposed Acres per Ability Level								
								Level	0	1	2	3	4	5	6	
A																
B1	6550	5550	1000	9630	10.4%	30	6.6	1		6.6						
B2	6610	6200	410	1790	22.9%	200	8.2	3				8.2				
B3	6790	6080	710	2770	25.6%	200	12.7	3				12.7				
B4	6790	5680	1110	3830	29.0%	200	17.6	3				17.6				
B5	6790	5690	1100	3960	27.8%	240	21.8	3				21.8				
B6	6660	5720	880	3150	27.9%	220	15.9	3				15.9				
B7	6790	5720	1070	5290	20.2%	150	18.2	2			18.2					
B8	5720	5300	420	4700	8.9%	20	2.2	1		2.2						
B9	6400	5360	1040	3300	31.5%	200	15.2	5					15.2			
B10	5630	5400	230	430	53.5%	160	1.6	6							1.6	
B101	5550	5350	200	2000	10.0%	30	1.4	1		1.4						
B112**	6780	6610	170	3140	5.4%	24	1.7	1		1.7						
B113	6660	5550	1110	3570	31.1%	150	12.3	4				12.3				
B116	5720	5550	170	410	41.5%	100	0.9	4				0.9				
B117	6250	5550	700	2310	30.3%	150	8.0	3						8.0		
B118	5720	5350	370	3530	10.5%	30	2.4	1		2.4						
B trails			10690	53810	19.9%		146.7			14	18	76	13	23	2	
C1	6760	6730	50	390	12.8%	40	0.4	6		0.4						
C2	6730	5860	870	1710	50.9%	180	7.1	6							7.1	
C3	6450	5600	850	2100	40.5%	180	8.7	5						8.7		
C trails			1770	4200	38.1%		16.1			0	0	0	0	9	7	
D1	6790	6660	130	1000	13.0%	150	3.4	0	3.4							
<b>Proposed Expansion, Project acres</b>							<b>166.3</b>			3.4	15	18	76	13	32	9
Project Terrain Distribution							100%			<b>2.0%</b>	<b>9%</b>	<b>11%</b>	<b>46%</b>	<b>8%</b>	<b>19%</b>	<b>5%</b>
<b>New Total Resort acres</b>							<b>441.5</b>			4.2	27	33	110	74	76	117
New Dist. Total Resort: Existing/Approved&Proposed-Acreage							100%			<b>1.0%</b>	<b>6%</b>	<b>8%</b>	<b>25%</b>	<b>17%</b>	<b>17%</b>	<b>26%</b>
New Total Resort Terrain Distribution by SAOT							3392				968		1847		577	

**Ability Levels:**

0= First Practice, 1= Novice, 2= Low Interm. 3= Intermediate, 4= High Interm., 5= Advanced and 6= Expert

Note: \*\* Inadequate steepness for downhill skiing and snowboarding by Alpentech

<b>Table 19 Summary by SAOT</b>						
	Existing		plus Approved		plus Proposed	
	SAOT	% Total	SAOT	% Total	SAOT	% Total
Beginner, Novice & Lower Interm	296	20%	423	23%	968	29%
Intermediate & High Intermediate	790	52%	952	52%	1847	54%
Advance and Expert	424	28%	455	25%	577	17%
<b>Total SAOT</b>	<b>1510</b>		<b>1830</b>		<b>3392</b>	

## **Skier Traffic**

Even with more total skiers using Snowbowl, skier traffic flow and skier distribution will improve. Beginners and Intermediates will be able to leave the base area (and return if they want to) via the “C” lift to their own area at the summit of T.V. Mountain. This will relieve congestion at the base area, especially on Sunrise Bowl and at the Rope Tow, as well as the lunch congestion from skiers coming down to the base area at that time. Intermediates will have an assortment of trails to ski besides the LaValle trails, reducing congestion at the LaValle Lift. At the end of the day skiers on T.V. Mountain will have several choices of routes back to the base. This includes taking the “C” lift down to the base (the easiest route), skiing trail B-7 to B-8, or taking trail B-9 (with grooming this could be made a lower-level or intermediate trail) back to the base. They can also join up via B-112 or the C trails back to the existing area trails and come back via the current routes. Skiers will be spread out enough that at the end of the day the traffic will be acceptable.

## **Specialized Skiing Terrain-Terrain Park**

Terrain parks are becoming a commonly requested feature at ski areas. Currently the only suitable area at Snowbowl for a terrain park is on Sunrise Bowl, but as noted on page 15, Existing Specialized Skiing Terrain and Competitive Snow Sports Venues, there is not any space left on Sunrise Bowl for a terrain park or other specialized skiing features. A terrain park is proposed off the summit of TV Mountain on the upper part of trail B4. There is adequate space and appropriate slope plus because the summit area of TV Mountain will be designed to function as a second base area it will have many of the features that have made Sunrise Bowl an excellent event and special purpose area such as closeness to skier services (for spectators, event officials, etc.), snowmaking and good lift access. Congestion would not be a problem because there is more space and the traffic flow will have skiers moving away from each other instead of funneling together as they do on Sunrise Bowl. No additional facilities would be needed to accommodate a terrain park at the summit of TV Mountain.

## **North LaValle Runs – 1996 Plan**

Please see the discussion above on the North LaValle T-bar. These runs are listed in Table 8, Existing and Approved Winter Trail Inventory (page 13).

## **6f. New Skier Services Facilities**

To accommodate increased skier use and needs, Snowbowl proposes to build three new skier services buildings totaling approximately 7000 square feet. One will be constructed at the summit of TV Mountain, a second at the bottom of chairlift B and the third in the base area. The current skier services facilities have a capacity of approximately 1630 for seating and restrooms. With the installation of the “B” chairlift the theoretical lift capacity would be 1946. To provide adequate services for this increase, the two new buildings on TV Mountain would be constructed. In keeping the goals as described in section 7, “Implementation and Phasing” the summit building would initially be partially finished and equipped to service this new capacity with a warming area for skiers, limited food service, restrooms and ski patrol station. Later this building would be completed with the addition of running water (if not already installed) and expanded food services, restroom facilities and other skier services including ski school. The structure at the bottom of chairlift B would have space for skiers including an area for warming and ski school gathering as well as general utility space. The third building in the resort base area would be built a few years later when the “C” lift is installed and there is a need for more skier service capacity. Both the summit and base area buildings will be designed to be enlarged with the growth in skier demand. The TV Mountain summit facilities eventually would provide nearly all the services that the resort base area offers including most of the ski school operations. It would be a second base area giving skiers another option and taking pressure off the main base area. The total space and its distribution by location and function is summarized in Table 20 (next page). In Table 20 it is assumed that the total space of the TV Mountain summit building and the base area building would be divided approximately one third and two thirds respectively. The proposed locations of the buildings are shown in Appendix A maps, the base area site map and the overall site map.

Greater usage (more skier visits) will allow Snowbowl to invest more resources into improving skier services and other intangible aspects of a customers experience at Snowbowl. All new and remodeled buildings will meet the requirements of Section 504 of the Rehabilitation Act to provide access for people with disabilities. Where readily achievable, the base facilities will provide accessible parking, restrooms, and drinking water and telephone services. With the installation of the “C” lift and the TV Mountain summit building, Snowbowl will be able to better accommodate skiers needing accessible services. With more skiers there will be more resources to meet an increased demand for enhanced skier services such as mountain hosts, information services and other skier services to provide a quality experience for our customers. The costs for enhanced skier services have been included in financial projections.

**Table 20**

PROPOSED AND EXISTING SPACE BY FACILITY AND USE (sq ft)														
TYPE OF USE	CURRENT FACILITIES for SAOT of appx 1600							PROPOSED & GUIDELINES for 2400 SAOT						
	Snowbowl Lodge	Last Run Inn	Grizzly Chalet	Geldespr Lodge	Nila Lodge	Warming Hut	Current Totals	Chair Base	TV Summit	New Blgd Base Area	SB Prop Totals	Industry Guidelines*		
Restaurant Seating (sq ft)	2050	2200	860				5110		1200	1900	8210	8160		
Seating capacity @ 1/4.5 turn	163	159	40				362		80	120	562			
Outdoor sq. feet	734	716	180				1629		360	540	2529			
		900					900							
Restrooms														
Men's Toilets	3	1					4	1	1	2	8	9		
Urinals	4	3					7	1	1	2	10	8		
Sinks	2	2					4	1	1	1	6	6		
Women's Toilets	6	4	1				11	2	3	3	16	13		
Sinks	3	3					6	2	2	2	10	10		
Ski rental and retail				1800			1800				1800	1920		
Other Skier Services	3200	1070	60			300	4630	300	500	1000	6430	5640		
Other Administrative	550	100	500	200	1100		2450	200	500	1350	4500	4800		
Total for building	5800	3370	1420	2000	1100	300	13990	500	2200	4250	20940			
TOTAL without guest rooms							13990				20940	20520		
Guest Rooms				4000			4000				4000			
TOTAL SPACE							17990				24940			
* Standards developed by Snow Engineering in "Red Lodge Mountain Ski Area Masterplan"														

## **6g. Infrastructure Improvements**

### **Snow Making**

Ski trails on lower elevations of TV Mountain with a west and southwest aspect will have increased snow loss in the later season (after mid March). They have similar aspect to existing trails of Longhorn and Paradise although they're not quite as low. Snowbowl's been very successful in keeping Longhorn and Paradise open until the end of the ski season with the use of snow making. Snow making should be even more successful on TV Mountain as these trails are somewhat higher in elevation, have less pitch and will be wider. All these factors will contribute to the ability to hold snow and to move snow with grooming. The best way to describe the snowmaking coverage at this point is using the same logic as in the 1996 Decision Notice, which is elevation and trail type instead of specific trails. The total would be 25 acres of additional snowmaking and require 15 acre-feet of water. The precise locations will depend on how the trails come out "on the ground." Most of the snow making will be installed on a few lower level trails below 6,500 feet (most likely B7, B8, B117, B118, and either B4, B5 or B6), but would also be considered for selected areas above 6500 feet on B3, B7, B112, D1 and possibly on C2, C3 or B9. However, the total volume of water and trail acreage would not exceed 15 acre feet of water on 25 acres of trail. The snow making system would be connected to the existing system and an additional reservoir would be constructed on the north summit of TV Mountain. This reservoir would be used to gravity feed the system on TV Mountain and would be filled from the existing pump house at the Spartan Saddle. The reservoir would be similar to the size of the existing Spartan Saddle reservoir, approximately 6 acre-feet. The additional water for the TV Mountain system would require an addition to the current water rights (see page 18) or a new water right. The water right application will be filed concurrently with this plan so that the water will be available if and when this plan is approved. At this time the plan is to obtain water from the current two sources, a well and surface source at the base. The flow rate of diversion would not change, but water would be diverted for a longer period of time to obtain the additional 15 acre feet. The additional water rights would be obtained for this 15 acre feet. The additional water storage, as well as the entire snow making system would be an asset for fire protection and fire fighting as demonstrated in the 2003 fire season.

### **Maintenance Facilities**

Maintenance facilities will be eventually moved to the most southern portion of the access road where it switchbacks and currently is used for storage of road gravel. One or two buildings will be constructed in this area. Electrical power will be brought to the area. This will allow the storage and parking of the snow grooming vehicles and other maintenance vehicles out of the base area. At current time they are parked in the base where potentially they are a hazard for guests as well as using up parking space, which is at a premium at the base. It's estimated that moving the maintenance facilities would free up space for an additional 30 parking spaces.

### **Waste Water**

Acceptable locations for septic drain fields are limited at the Snowbowl base and to provide wastewater treatment as the current system ages, for additional users and for the TV Mountain summit building it is proposed to add additional drain fields at remote locations. Three potential

sites have been identified: 1) Spartan saddle (near the existing reservoir); 2) the summit of TV Mountain and 3) the most southern part of the proposed TV Mountain expansion south of proposed trail 118. Anyone of these sites has adequate area for drain fields and replacements (estimated drain field size would be 20,000 square feet). For the skier services building on top of TV Mountain, a drain field on the summit would be preferred (and would be approximately 2000 square feet for this facility). The preferred location for the base area would be either Spartan Saddle or the area south of trail 118. This system(s) would be of conventional design (septic tanks with pumped effluent to absorption trenches) and would meet the design standards and require approval of the Montana Department of Health.

### **Parking and Access**

As stated earlier, prior to the initiation of the projects on this plan, the Snowbowl road would be improved to a standard required by the Forest Service (28 foot width including 24 foot driving surface and 2 foot shoulders). As part of that road improvement more parking will be developed at the last two tight turns and along the road. Road and parking construction started in the summer of 2003 and is scheduled to be completed in 2005. Other parking would be available by moving the maintenance vehicles as described above. It is anticipated that 330 new parking spaces would be obtained with the road improvement and the maintenance changes, which would be adequate for the proposed capacity. In addition the current bus service could be expanded to carry an additional 120 skiers for a total of 200 skiers using the bus service. All of these improvements would result in a total parking-transportation capacity of 2425 skiers (at 2.5 skiers per vehicle and 40 per bus, see page 15 and 16). These changes are summarized in Appendix B. Although the parking capacity of this plan is in balance with other facility capacities, as backup Snowbowl has two other options to increase parking capacity that have not been included in the above calculations. One is to improve efficiency by encouraging more carpooling with various incentives. The second is to operate a continuous shuttle service on busy days to Snowbowl's off site parking lot at the base of Grant Creek (next to the Sevenar store). The off site lot is over four acres and would have the capacity for over 600 vehicles with supervised parking. Either one or both of these options could be initiated quickly (even mid season) when management felt parking capacity at the ski area could be exceeded (for example a major competition).

### **6h. Expanded Summer Use**

Summer use would continue on the same schedule as it is now with a gradual expansion and improvement of facilities including more summer trails for mountain biking and hiking and more modern upper mountain guest facilities. With the construction of the "C lift and the guest service facilities on the summit of TV Mountain more of the summer activity would be centered there. Hiking/mountain biking trails would be constructed from the TV Mountain summit to connect with the existing trails. As shown on the map, one new trail would come down the west side of TV Mountain and join the Point 6 road (one of the existing trails). Another trail would leave the summit of TV Mountain along ski trail B112 to the Spartan saddle where riders could either take the existing 2<sup>nd</sup> Thought trail (#18) to the base or ride up hill on a new trail across Mission Magic (#9) to the top of the Grizzly lift. There they would hook up with existing trail that goes through the Bowls, Longhorn and Paradise to reach the base area. A golf course may be added on TV Mountain.

## 7. Implementation and Phasing

To conceptualize the implementation and phasing of these improvements and expansion a ten year time frame was used starting with the last completed year, 2002-03. In Table 21 the changes, improvements and resulting skier capacities are summarized with a conceptual progression of construction over this time period. Although specific years are listed on the table, the schedule is flexible and could be accelerated or delayed depending on financial, skier demand and other factors.

The projects are sequenced to not only keep the ski area facilities (lifts, trails, parking and skier services) in the best balance but also to balance the available financial resources, risks (bad snow year, etc) with growth in skier demand. The first years will be devoted to obtaining the necessary environmental documents, the EIS, improving the Snowbowl road and developing more parking. At the current time, parking seems to be the main constraint to skier capacity especially without close supervision. With the completion of the first section of road, parking capacity increased by 150 spaces and will help relieve this situation. This additional parking provided in 2003 will increase the SAOT capacity of parking to 1855 skiers and will change the limiting capacity factor to lift capacity. Because the lift capacity does not change the overall calculated SAOT will remain at 1408. With the completion of the road and the EIS, design and preliminary construction of the B Lift (the west TV Mountain lift) and the related trails would begin. Lift B is the key lift to the expansion. With Lift B, the glide paths and related lower level trails around the Lift B, TV Mountain would be opened. During this first phase there would also be the initial installation of snow making and the construction of the two buildings on TV Mountain, the summit building with limited eating and restroom facilities at the top of TV Mountain and the building at the base of chairlift B. After skiing is available on TV Mountain it is anticipated that lift capacity out of the base area will become the limiting factor. This will be addressed in 2008, which includes the design and preconstruction of Lift C and more trails mainly on the west and southwest side of TV Mountain. Lift C is an important component of the plan because this lift will allow lower level skiers better access to the terrain on TV Mountain. As noted above this timetable is flexible and if demand justifies it and it is financially feasible the C lift and associated improvements would be installed sooner. Additional snowmaking would be installed, an extra groomer to take care of the increased terrain would be obtained and additional skier services space would be added either with expansion of the TV Mountain building or a new base building. Both of these buildings would be designed to be expanded in phases as needed. Lift C construction is projected for the 2009-2010 year and would be available for operation the next ski season, 2010-2011. With the completion of the Lift C, design and construction of Lift A would begin. Further snowmaking would be installed and as demand increased, phase 2 of the TV Mountain/base building could begin. Also, depending on demand and need to accommodate more skiers, the bus service would be expanded to accommodate approximately another 150 skier visits per day. With the installation of Lift A in 2011-12 and the remaining trails associated with Lift A, trail A-70 and A-71, expansion would be nearly complete, bringing the skier capacity of lifts and trails to 2,345 SAOT, the base building seating

to approximately 2,409, and the parking to 2,350. Other opportunities to expand snow making, increase the base building size (phase 3 of the base building), add more grooming, moving the maintenance facilities and adding more parking are anticipated in future years and are listed for 2012-2013. For the years 2013 on, the lift and remaining runs in the north LaValle area and other trails approved in 1996, would be constructed.

This progression in improvements and increase in capacity fits the current and anticipated growth in demand. For example, taking a conservative approach and assuming skier visits will continue to increase at the same 3-4% annual rate that they have the last 10 years; there would be approximately 91,000 visits in the year 2009-10 (based on population projections and potential skier market from Table 10, page 17 there could be 145,000 visits). Then comparing this to the capacity of about 2,271 SAOT projected for 2009-2010, times 113 operating days gives a maximum theoretical capacity of 256,510 skier visits. Reducing this maximum theoretical capacity by a utilization rate of 40%, which is a desirable rate as far as Snowbowl's management is concerned, would result in 102,600 skier visits. Which is a good correlation between anticipated skier growth and capacity of the ski area while still leaving room for future growth.

## Table 21 Conceptual Phasing of Improvements and Capacity Changes

Fiscal Year 12/1to1/30	Improvements Existing facilities 2002	Added		Mountain Capacity		Base Capacity		Parking (spaces X 2.5) Capacity-Skiers
		Trails Acres	Lift SAOT	Trails and Lifts New Mountain Capacity	Seating-Skiers 4.5 turnovers a seat	1629 SAOT	1480	
2002-03	Start road construction and continue Masterplan 150 parking spaces with road construction							1855
2003-04	Continue road construction and finish Masterplan							2230
2004-05	Finish road construction and start EIS 150 parking spaces with road construction							
2005-06	Finish EIS Design & pre construction lift B & trails							
2006-07	Lift B Trails B1, B101, B112, B118, B8, B7, B5, B9 B10, L61, L58T Snowmaking TV Mt.; Building top TV Mt	75.4		538	1946 SAOT	360 new New total 1989		
2007-08	Trails B9, B10 Cont snowmaking, Bid base of Lift B							
2008-09	Design and pre construction lift C Trails B4, B6, B116, C3, Phase I new base building/expansion TV Mn building Cont snowmaking, Extra groomer, waste water system	43.1				300 new New total 2289		
2009-10	Lift C, Lift D Trails B117, B2, B3	28.9		325	2271 SAOT			
2010-11	Design and pre construction lift A Trails D1, B113, C2, C1 Phase II Base building Continue snowmaking Expand bus service	22.8				120 new New total 2409		2350
2011-12	Lift A Trails A70, A71 Continue snowmaking TV Mt	4.3		74	2345 SAOT			
2012 -13	Phase III Base building Extra groomer Move maintenance facilities (30 park spaces)					120 new New total 2529		2425
2013-----	Lift L and Trails 58,59,61,68,69,73,51, 52,56,64	30.8		37	2382 SAOT			

# Appendix A

## Maps

Masterplan Topo

Base Area Topo

Base Area Detail Topo

## APPENDIX B Comparison of Current, Approved and Proposed Facilities

Project Components	Current	Approved	Proposed
<b>Alpine Ski Area Capacity</b>	1408	1758	2382
<b>Project Area (acres)</b>			
Special Use Permit (SUP)	1138	1138	2226
Private Land	80	80	80
Total Acreage	1218	1218	2306
<b>Lifts</b>			
Total Number of Lifts	4	6	9
Total Lift Capacity (PPH)	4061	5411	7061
Total Lift SAOT	1408	1758	2382
Out of Base Capacity (PPH)	1961	1961	2761
Cycle Time for SAOT out-of-base (hrs:min)	:47	:55	:48
Chair Lifts	2	3	5
Surface Lifts (T-bar / Tows)	2(1/1)	3(2/1)	4(2/2)
<b>Trails</b>			
New Cleared Acres		39	109
New Trail Acres previously cleared			77
Total New Trail Acres		39	186
Ski Terrain Acres by Ability Level (%)			
Beginner/Novice/Lower Intermediate	19.9(8%)	28.2 (10%)	64.2(15%)
Intermediate	79.1 (33%)	95.6 (35%)	184(42%)
Advanced/Expert	141.4 (59%)	151.8 (55%)	193(43%)
Total Acres	240	275	441
Ski Runs by Ability Level (%)			
Beginner/Novice/Lower Intermediate	8 (17%)	11 (18%)	18 (23%)
Intermediate	20 (43%)	26 (43%)	34 (42%)
Advanced/Expert	19 (40%)	23 (38%)	28 (35%)
Total Runs	47	60	80
Ski Terrain by SAOT & as % of total SAOT			
Beginner/Novice/Lower Intermediate	296 / 20 %	423 / 23 %	968 / 29 %
Intermediate	790 / 52 %	952 / 52 %	1847 / 54 %
Advanced/Expert	424 / 28 %	455 / 25 %	577 / 17 %
Total SAOT	1510	1830	3392
<b>Support Facilities</b>			
Total Number of Buildings	6	6	8
Base Area (sq.ft./seats)	12270/ 322	13050 /348	16520/ 442
Midway – Grizzly Chalet (sq.ft./seats)	1420/ 40	1420 /40	1420/ 40
Midway-TV Mt (sq.ft./seats)			2200/ 80
Base Lift B-TV Mt (sq.ft.)			500
Total Facilities (sq. ft./seats)	13990/ 362	14770 /388	20940/ 562
Restroom Toilets/Urinals	15/ 7	17 /8	24/ 10
<b>Parking</b>			
Existing Skier Parking Space	560	560	560
New Parking Space	150	150	330
Total Space	710	710	890
Total Skier Parking (@2.5/vehicle)	1775	1775	2225
Skiers per Shuttle Buses/Bus Trips	80/ 2	200/ 5	200/ 5
Total Skier	1855	1975	2425
<b>Other Recreational Opportunities</b>			
Hiking/MT Biking Roads (Miles)	20	20	20
New “Single Track” Trails			5

Skier at one time “SAOT” represents a relative measure of the number of skiers that an area can comfortably handle in one day based on industry guidelines (see text and Appendix D)

### Existing and Proposed Lift Statistics

Name	Elevation		Horiz. ft.	Vert. ft.	Cap p/h	Rope Speed ft/m	Ride Time min	Vertical Trans ft		Hours Open	Eff use/d	Access Reduction	Million VTF/d	Avg. Slope	Demand v-ft/p/d*	SAOT
	Top	Bot.						Trans ft	Open							
<b>Existing Lifts</b>																
Grizzly Chair	7000	5030	4800	1970	1150	450	12	2266	6.5	90%	25%	9.940	41%	13000	764	
LaValle Chair	7522	6550	3000	972	1200	450	7	1166	6.0	90%	15%	5.354	32%	11500	465	
Sunrise T-Bar	5528	5020	1620	508	811	581	3	412	6.0	30%	0%	0.742	31%	6000	123	
Beginner Tow	5095	5025	460	70	900	450	1	63	6.0	45%	0%	0.170	15%	3000	56	
<b>Total Existing</b>			9880	3520	4061			3907				16.205	36%		1408	
<b>Proposed Lifts</b>																
A chair lift	6790	5930	3910	860	800	450	9	688	5.5	90%	75%	0.851	22%	11500	74	
B	6790	5440	4900	1350	1000	450	11	1350	6.0	90%	15%	6.197	28%	11500	538	
C (pulse lift)	6790	4980	3860	1810	800	450	9	1448	6.5	50%	25%	3.530	47%	12500	282	
D (beginner tow)	6790	6660	800	130	450	450	2	59	5.0	45%	0%	0.132	16%	3000	43	
L LaValle T-Bar	7350	6720	1000	300	400	450	2	120	5.5	40%	15%	0.224	30%	6000	37	
<b>Total Proposed</b>			14470	4450	3450			3665				10.933	31%		974	
<b>Grand Totals</b>			24350	7970	7511			7571					33%		2382	
<b>Options</b>																
Option A T-bar	6970	6610	1620	360	800	450	4	288	5.5	50%	60%	0.317	22%	10000	31	

\* Demand "vertical transport feet per person per day" based on the mix of the ability levels of skiers using that lift; Expert/Advanced 14 to 20,000 v-ft/day, Intermediate 7 to 14,000 v-ft/ day; and Beginner/Novice/L Intermediate 2 to 7000 v-ft/ day

SAOT is calculated by first multiplying the "Vertical Feet" by the "Capacity-persons per hour" to get the "Vertical Transport Feet"; "Vertical Transport Feet" is then multiplied by the "Hours Open", the "Efficiency of Use" and "Access Reduction" to get "Vertical Transport Feet per Day in Millions"

When the "Vertical Transport Feet per Day" is divided by the "Demand in vertical feet per person per day" the SAOT of that lift is found.

The "Demand v-ft/p/d" is the amount of vertical a typical skier on that lift would ski in a day. Beginner ski less per day than Experts.

## Appendix D

### Skiing Capacity Terminology

**Skiers** Alpine skiers, telemark skiers and snowboard skiers

**SAOT** Skiers At One Time, may refer to at one time, for a day or for an operating period

**Comfortable Capacity** The population level below which most participants will have a satisfactory experience. This will vary by type of clientele and average skill levels.

**Ski Area Comfortable Capacity** Skiers will accept crowds in excess of comfortable capacity on a few holidays, peak season and powder days. When charting the daily number of skiers from the most attended days to the least the curve will drop sharply and flatten out at the comfortable capacity. (See page 7 of plan). For a planned ski area this factor can be calculated for each of the various facilities of the ski area (seating area, lifts etc.) SAOT in this case is the number of skiers per day or operation period.

**Lift SAOT** The number of skiers per operating period that can be accommodated to meet the average demand for vertical skied (see Appendix C). Skiers generally consider Lift SAOT as the area's SAOT.

**Ski Terrain SAOT** The number of skiers at one time derived by multiplying the acceptable density of skiers per acre by the acreage of the run. Acceptable density varies by a run's steepness, width and skier skill levels (refer to page 12). Snowmaking and grooming will increase acceptable densities. Summaries of ski terrain SAOTs are very useful for planning to balance terrain with skier skill levels, but total terrain SAOT almost never is a limit to ski area capacity. However, ski terrain that is not in balance with skiers' skill levels can be a limitation.