

APPENDIX VI

POTENTIAL ALPINE SKI AREA SITES

IN THE HATCHER PASS AREA

FOR: DEPARTMENT OF NATURAL RESOURCES
STATE OF ALASKA

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An analysis and evaluation of terrain, avalanche potential, vegetation, snow cover distribution, local weather patterns and general development potential.

GENERAL OVERVIEW

Six pre-selected sites for potential alpine ski area development in the Hatcher Pass area were examined for suitability with relation to terrain diversity, avalanche hazard, skier traffic flow, snow depths, vegetation, wind and general development potential.

The Hatcher Pass area of the Talkeetna Mountains is composed of topography demonstrative of recent alpine glaciation and active mountain building. The retreat of the last glacial age and subsequent weathering have produced numerous alpine cirques with steep exposed rock ridges and large nearly flat basins, especially in drainages with a northerly exposure. Drainages with more southerly exposures exhibit more moderate terrain generally with less evidence of glaciation. Of the six pre-selected sites, four have predominant northerly aspects and the remaining two face east and south.

Climate in the area would be characterized as transitional, between the maritime regime prevalent along the Gulf of Alaska and the extreme continental climate of the interior. Being between two regimes, the area receives moderate amounts of snowfall, occasionally very cold temperatures, moderate winds, and an occasional mild winter storm.

The following paragraphs will describe the sites collectively and then comparatively with respect to terrain and hazard analysis and development potential.

TERRAIN ANALYSIS

Ski industry standards for slope gradients accepted for developed alpine ski areas indicate that beginner terrain should be less than 25%, intermediate terrain from 25% to 40% and advanced terrain greater than 40%. National Ski Area Association research has determined an ideal terrain mix and this is compared with the six pre-selected sites in Table #1 as compiled from maps supplied by DNR roughly outlining the potential sites. Also included is a column indicating hazard areas which are unskiable due to excessive steepness, exposed rocks, inaccessibility or avalanche hazard.

<u>TABLE #1</u>	<u>BEGINNER</u>	<u>INTERMEDIATE</u>	<u>ADVANCED</u>	<u>HAZARD</u>
Industry Standard	23%	59%	18%	0%
Government Peak	32%	28%	17%	23%
Hatcher West	56%	13%	14%	17%
Grubstake Gulch	38%	23%	22%	17%
Sidney Creek	45%	5%	30%	20%
Lone Tree	32%	18%	29%	21%
Government Creek	15%	19%	48%	18%

Analysis of Table 1 indicates a high percentage of beginner terrain, a high percentage of advanced and hazardous terrain, and a low percentage of available intermediate terrain. The Government Peak site rates highest for intermediate terrain, yet it has less than half the recognized industry standard.

All sites except Government Creek and Government Peak are primarily north facing and the terrain mix is indicative of glaciated topography; steep sidewalls and gently rolling basins. These basins are alpine in nature with no trees, dotted with small pot-hole depressions and glacial erratics (boulders). These anomalies create hazards to skiers reducing the suitability for development without extensive modification.

The Government Creek basin is oriented primarily south with sidewalls facing both west and east. This orientation is unique since most developed ski areas are oriented to the north to take advantage of low sun angle to preserve snow. The low sun angle during Alaskan winters detracts from the skiing experience (low light = bad visibility) and it is not unreasonable to develop an area with an orientation other than north to enhance the ski experience.

The Government Peak site is oriented toward the east and offers some north and south exposures on either side of the two main ridge systems within the study site. On-site inspection showed a variety of snow conditions from spring snow on southerly exposures to cold winter powder on the northerly aspects.

SNOW AND WEATHER

Detailed long term weather data for the site locale does not exist, but S.C.S. snow courses, scattered records from mining concerns, and long-time nearby residents paint a consistent picture of typical weather patterns for the area. Early season storm episodes give way to protracted cold periods with no precipitation, during which the snowpack forms unstable "depth hoar" crystals. In undisturbed areas, this type of snowpack can produce avalanche problems throughout the winter season as additional snow accumulates above this weak layer until the stress of new snow causes collapse of the depth hoar. Constant compaction of the snow (skier traffic) tends to stabilize these weak cold layers by breaking them down to some extent.

All of the sites inspected do have some areas which present an avalanche hazard, but in most instances early season compaction of these slopes (machines or skiers) and standard avalanche control measures during storms (handplaced explosives) would mitigate these hazards. Military artillery would not be needed at any of the sites evaluated. Of primary concern would be the out of bounds areas beyond a developed site where skier compaction does not take place and instabilities linger. Strict control of area boundaries would be necessary to preclude the possibility of avalanche accidents in nearby terrain for all the sites evaluated. In addition, steep snow chutes inaccessible to hand charge control methods would require stabilization by explosives using systems such as an avalauncher, a gas powered explosive delivery system, or bomb tram, a simple cable delivery system for explosive charges.

According to snow course information and on-site evaluation, all the sites have comparable amounts of snowfall, being of similar elevation and vertical drop (approximately 2000 feet at the bottom and 4000 feet at the top). The Hatcher Pass west site, which has a base elevation of 3200 feet and a north orientation can be expected to retain snow longer in the spring. Distribution of observed snow cover ranged from 24" to 30" at lower elevation plots (1800 feet elevation) to a maximum of 65" at upper elevations (4000 feet). A study

plot near the 2700 foot level of the Government peak site monitored this winter indicated a maximum of approximately seven feet and on May 1, samples ranged from 45" to 60". This amount of snowpack in an above-average winter such as this indicates a marginal situation for development without supplemental man-made snow at lower elevations.

Winter storms which generate snowfalls for the area are often directed at low levels by the surrounding mountain topography. Storm systems approaching from the west, east and south must first pass over other high mountains which tend to reduce the amount of snow Hatcher pass receives as indicated by snow study plots at similar elevations in the Chugach Mountains and the Alaska Range. Bordering the Matanuska Valley, the area is prone to receive strong winds with easterly and northerly components at the end of major storm events and when large high pressure systems occupy the interior. Cornice formation induced by these winds is evident at all sites on the west and southwest facing ridgetops. Some scouring of eastern exposures along these ridges is also evident. These wind effects are considered moderate for the mountain environment and do not preclude development; however, further detailed wind data should be obtained for a prospective site to allow proper lift placement in less wind-affected areas.

VEGETATION

On-site inspection revealed an almost total lack of trees at all sites. Ski area development normally relies on the presence of trees to reduce wind at ground level, to serve as anchors to hold the snowpack in place (reducing avalanche potential), to offer points of reference, and in flatlight conditions, to offer "good seeing". These advantages are not available at the sites evaluated.

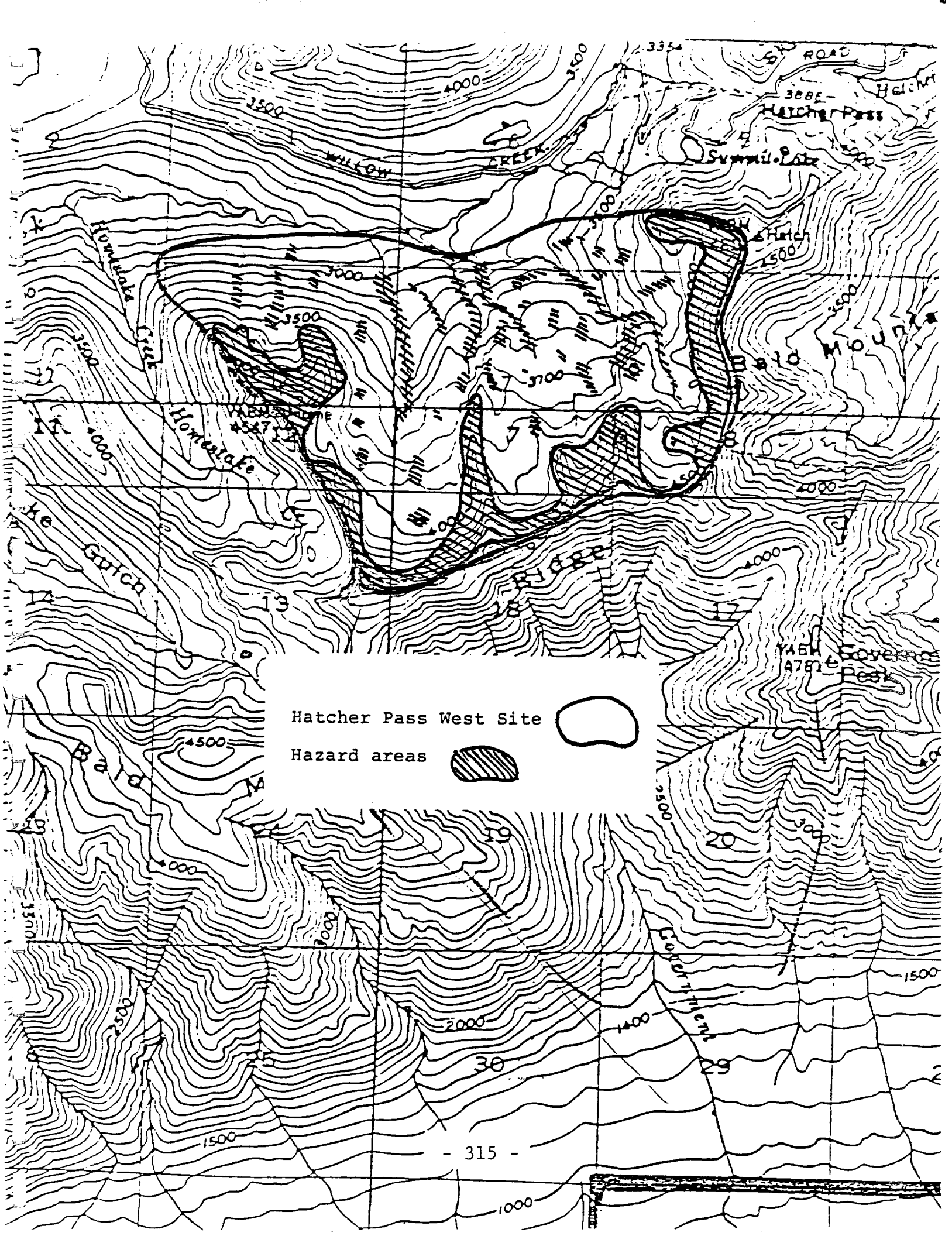
SITE EVALUATION

The six pre-selected sites were examined at low elevation and on the ground for development potential and the following evaluations made.

HATCHER PASS WEST. This potential site offers little terrain of intermediate gradient. The major portion of the site is a nearly flat irregular basin with deeply incised stream channels and rocky hummocks. Prohibitively expensive terrain modification would be required to develop this site. Access would require an avalanche-control program for the road from either the Willow Creek or Hatcher Pass side.

GRUBSTAKE GULCH. This two-mile long drainage terminating in an alpine cirque is what its name implies, a gulch. The center of the drainage is a steep walled, v-notched gully bisecting the area. Either side of the gulch in the basin are hummocks and bounders left by retreating glaciers. This site would encounter the same development problems associated with the Hatcher West Site.

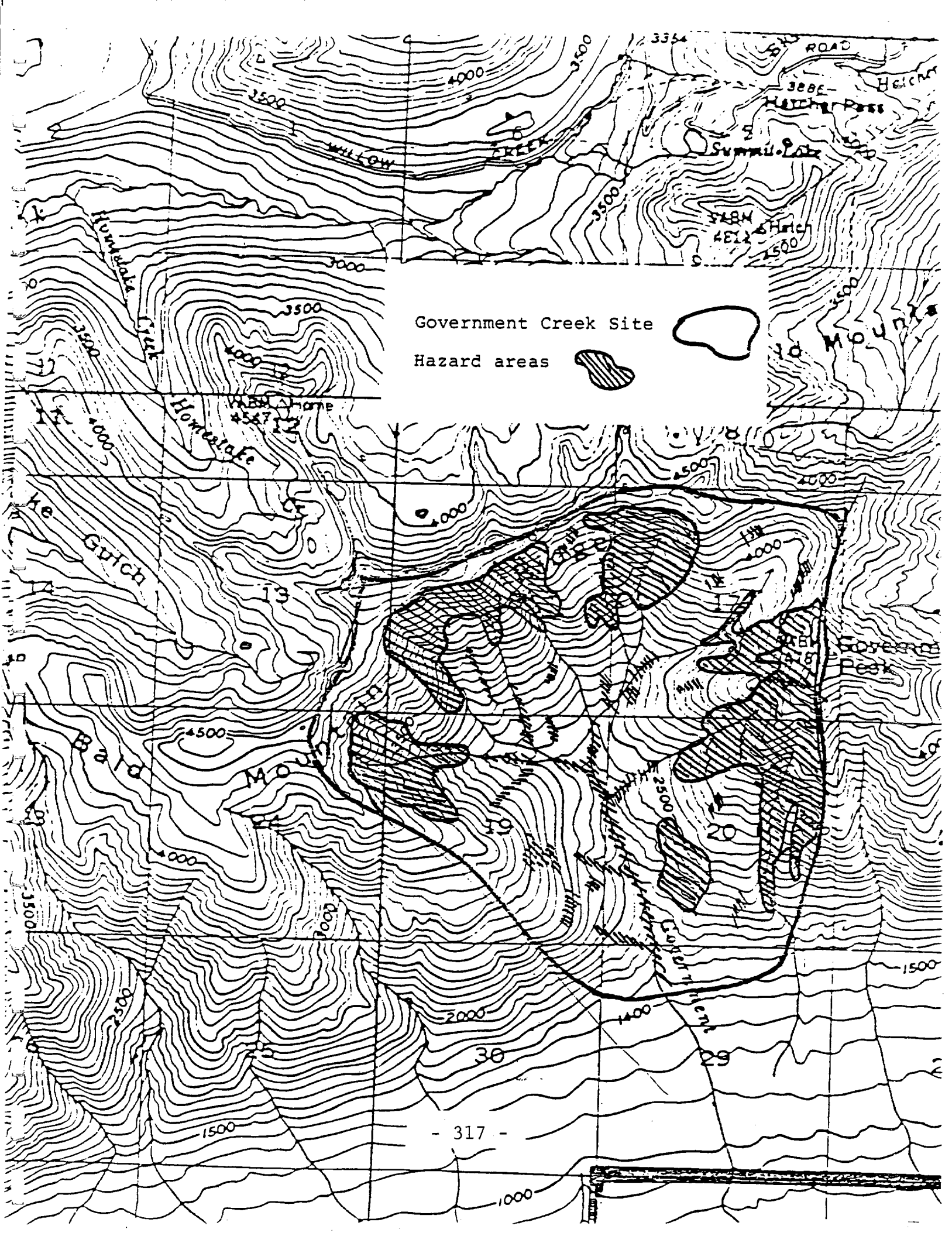
SIDNEY CREEK. This site has very little potential for alpine ski area development. Surrounded by cliffs and steep avalanche prone headwalls the floor of this basin exhibits the most irregular terrain of the sites evaluated and is strewn with large glacial erratics.



Hatcher Pass West Site

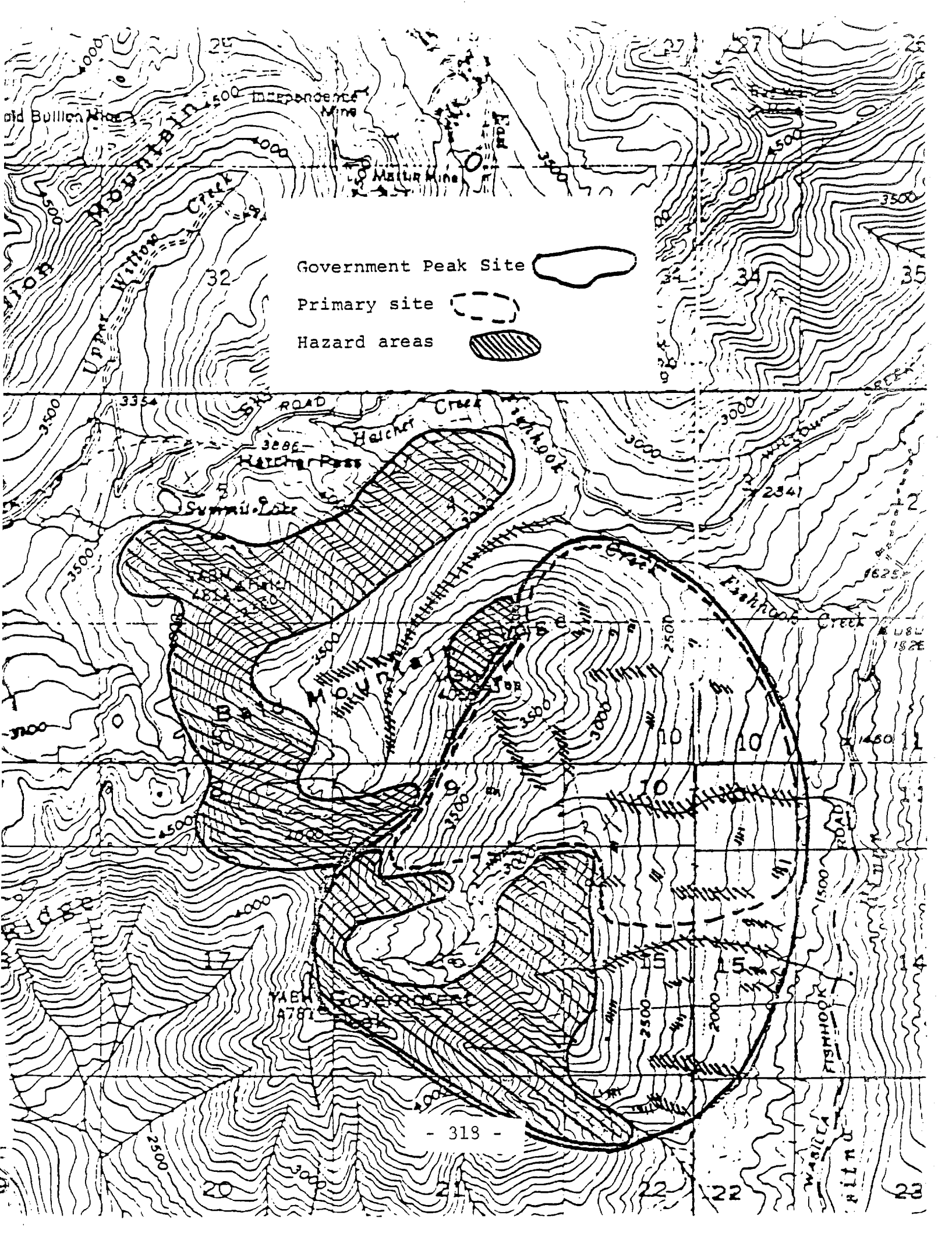
Hazard areas





Government Creek Site

Hazard areas



Government Peak Site

Primary site

Hazard areas

LONE TREE GULCH AND ARCO'S RIDGE. The two sites located three miles up the Little Susitna River drainage from the Roadhouse are very similar in all respects: steep, unskiable alpine cirques spilling into single deep stream drainages which empty into the main valley floor. Avalanche hazard at these sites is formidable, traffic flow patterns are not acceptable, and terrain modifications necessary would be prohibitively expensive.

GOVERNMENT CREEK. Largest of the sites evaluated, this basin is shaped rather like a funnel cut in half. All aspects of the basin flow into a narrow stream corridor. Almost half the basin is of advanced to expert gradient which moderates toward the base of the funnel. Facing south, this basin loses snow rapidly in the spring as evidenced by the creek being open and flowing from the 2500 foot elevation down on the day of our inspection. Avalanche hazard from the upper basin, lack of appropriate terrain mix, and the extreme "funnel" effect are detrimental to potential ski area development of this site.

GOVERNMENT PEAK. Of the six sites evaluated, this particular one offers the only realistic opportunity for development of alpine skiing. The pre-selected site included Government Peak itself and the steep ridge system to the east. Avalanche and terrain hazards in this southern portion of the site reduce its development potential; however, the northern portion has reasonable potential for developed alpine skiing.

Terrain mix in this primary site is; beginner 35%, intermediate 38%, advanced 17% and hazardous areas 10%. The terrain diversity, although not ideal, is enhanced by the fact that the gradient gradually steepens from bottom to top. Beginner terrain is at the bottom, intermediate terrain in the center and advanced terrain at the top. The primary site can furnish 2400 vertical feet of skiing from 1600 feet to 4000 feet.

Terrain hazards within the primary site are minimal; consisting of two stream channels which begin near peak BM 4068 trending southeast to east to the base area, and a few isolated rock benches. There are also a few boulders exposed on the lower slopes.

Avalanche hazard within the primary site is moderate to low due to the gentle gradients and rolling nature of the terrain. The steep alpine basin on the east flank of Government Peak avalanches frequently but the flat terrain and terminal moraine at its base stop the debris from reaching the primary site in all but rare cases of instability. This basin would have to be controlled during these periods with a remote delivery system. The north and east aspects of Bald Mountain Ridge (north of the primary site) are very steep snow slopes which could offer "backside skiing" under stable snow conditions, but entry would have to be strictly controlled and some control work carried out to preclude "out of bounds" avalanche accidents. The two areas rated advanced within the primary site would have to be controlled with hand charges during storm cycles, but skier compaction in these areas will reduce the need for avalanche control.

Traffic flow patterns are good with many fall line descents of 1000 feet to 1600 feet vertical possible. The large flat area from 2800 feet to 2500 feet and the stream cut below it are the only major terrain obstacles to be dealt with and proper lift placement could avoid these areas. The developable terrain is somewhat limited in acreage and can reasonably support no more than 1500 to 2000 skiers at one time using industry standards for skiers per acre according to ability level. Development on a large scale is thereby limited at this site.

As mentioned previously, the site is oriented to the east offering good sun exposure even during winter solstice; however, this orientation will produce a rapidly degrading snowpack in the Spring, especially in years of low snowfall. In order to insure adequate snowcover, a snow making system could be installed, primarily for the beginner terrain below 2500 feet. An ample water supply is available to support such a system. Burying the pipes to eliminate freezing will be costly at the site because of bedrock outcroppings and glacial erratics which would have to be blasted. Other terrain modifications necessary for base area facilities would be minimal and road access to Fishhook Road is very short.

CONCLUSIONS

Of the six sites in the Hatcher Pass area investigated, five have little potential as developed ski areas due to lack of appropriate skiable terrain without extensive modification. The northern portion of the Government peak site does have reasonable potential for a moderate size development to serve approximately 2,000 skiers at one time. If this site is to be considered for future use, a program to monitor winds, precipitation, snowpack, and avalanche activity should be developed to provide accurate data for future planning.