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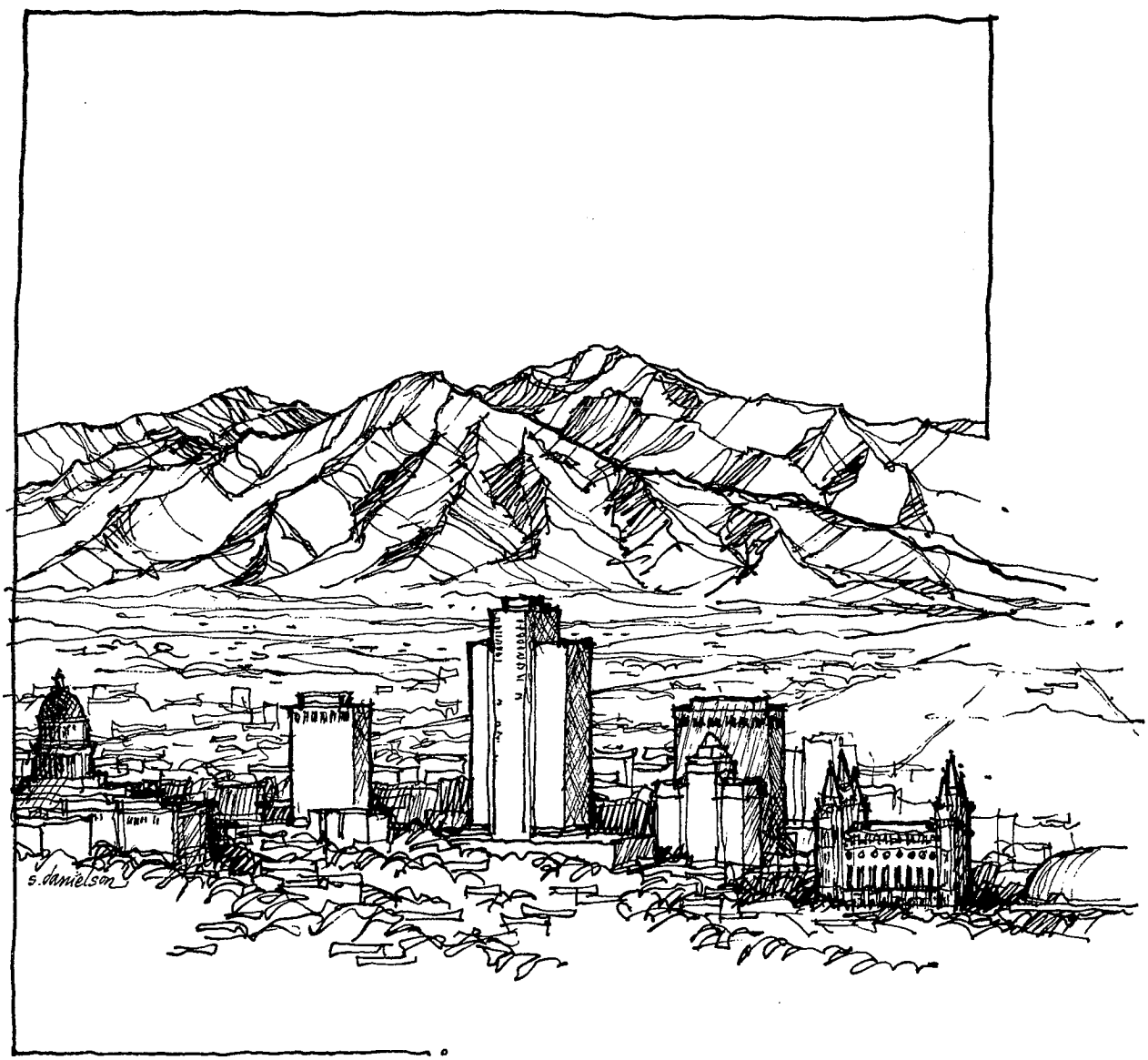
Wasatch Canyons Transportation Study

Working Paper No. 2

Opportunities for Immediate Improvements in Canyon Transportation

November 1975



Wasatch Front Regional Council

T - Transportation

OFFICE

WASATCH CANYONS TRANSPORTATION STUDY

WORKING PAPER NUMBER 2

OPPORTUNITIES FOR IMMEDIATE IMPROVEMENTS IN CANYON TRANSPORTATION

Prepared For The

WASATCH FRONT REGIONAL COUNCIL
AND
SALT LAKE COUNTY

Prepared By

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NOVEMBER, 1975

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FOREWORD

The Wasatch Canyons Transportation Study is a cooperative effort between the Wasatch Front Regional Council and the County of Salt Lake. The Study is funded in part by the Urban Mass Transportation Administration, U. S. Department of Transportation, with local matching funds and Study coordination provided by Salt Lake County. Cooperating agencies include the Salt Lake County Planning Commission, the Salt Lake County 208 Project, the U. S. Forest Service, the Utah State Department of Transportation, the Town of Alta, and numerous other local, regional and statewide agencies and organizations. The Study is being coordinated by Salt Lake County as part of the continuing planning process for the Canyons of the Wasatch Front. Project consultant is PBQ&D, Inc., San Francisco, California.

INTRODUCTION

This is the second in a series of eight working papers exploring immediate, short-range and future solutions for transportation in the Canyons of the Wasatch Front Range. As a portion of the overall Salt Lake County effort to develop planning guidelines for the Canyons, this transportation study is being conducted simultaneously with other programs designed to investigate land use and water quality in the Canyons. The transportation study is structured in three phases, as follows:

- Immediate Action Plan
- Short-Range Improvement Program
- Long-Range Development Concept

This report presents a series of opportunities and constraints for improving access-related conditions in the Wasatch Range within the next two years. Since the Immediate Action Program is concerned with improving transportation conditions in the very short term, this Working Paper focuses primarily on Big and Little Cottonwood Canyons where the more pronounced transportation problems within the Wasatch Range occur. Planning efforts directed at longer-range improvements will systematically consider other Canyons in Salt Lake County.

This Working Paper examines existing transportation facilities and services within the Cottonwood Canyons as well as other planning conditions including topography, land use, institutional arrangements and seasonal activity participation patterns. Alternative recommendations are formulated which deal respectively with traffic management strategies and transit service improvements, concentrating on access to the Cottonwood Canyons.

The basic objective of the Immediate Action Program is to recommend and implement measures which can serve a useful purpose in improving access while providing a series of "first steps" in a long-range package of strategies for comprehensive transportation planning in the Wasatch Front Canyons of Salt Lake County.

SUMMARY OF RECOMMENDATIONS

The immediate action recommendations for Canyon transportation improvements developed in this Working Paper fall into two basic areas: (1) traffic control strategies and (2) transit service improvements. Traffic control and traffic management approaches deal with means of improving the levels of safety and capacity and with means of reducing congestion and delay on Canyon roads. The recommendations in this area are made with the provision that suggested improvement measures shall avoid conflicting with long-term objectives for Canyon transportation, which may call for greater reliance on mass movement schemes. Thus, while certain measures can be implemented to improve traffic flow, such measures should not be construed as alleviating the need for general Canyon access improvements in the future, especially if levels of future Canyon development create increased demands for access.

Transit service improvements recommended in the Immediate Action Plan represent a cautious but innovative "first step" in the resolution of the ultimate question of public transit service in the Canyons: what will be the role of the Utah Transit Authority (UTA) in future transit improvements in the Canyons? Until such time as legal and franchise disputes between the public and private transit operators are resolved, it is appropriate at this time to include recommendations for a limited set of improvements designed primarily to fill an existing service vacuum.

Immediate action recommendations, which are fully developed and described in the final section of this Working Paper, include the following:

- Enforcement of ordinances requiring vehicles to be equipped with snow tires or have chains available at all times (and in all weather conditions) during the winter season in the Canyons.
- Enforcement of parking prohibitions.

- Improvement of plowing and snow clearance measures in existing legal parking areas.
- Improvement in road maintenance operations and coordination of road control.
- Implementation of various measures to spread recreation area demand over the course of a day, a week, or the entire ski season.
- Institution of limited transit service in Big and Little Cottonwood Canyons by the Utah Transit Authority to serve the substantial volume of resort area employees who commute by car up and down the Canyons daily. Existing and available parking areas in the Valley would be used for interim transfer facilities. This type of service should fulfill a particular transit service requirement and should also be designed to bring early resolution of the question of ultimate responsibility for Canyon area transit service.

BACKGROUND

Transportation in the Wasatch Canyons

Of the seven major canyons in the Salt Lake County portion of the Wasatch Front Range, five have significant traffic volumes. These are Emigration Canyon, Parleys Canyon, Mill Creek Canyon, Big Cottonwood Canyon, and Little Cottonwood Canyon. The heaviest traffic volumes occur in Parleys Canyon which is the location of Interstate 80. Most of the traffic in Parleys Canyon is through traffic, while the traffic in the other four canyons is generated primarily by canyon residences or recreation attractions. Figure 1 shows the study area and provides estimates of the annual average daily traffic (AADT) for Emigration, Parleys, Mill Creek, Big Cottonwood, and Little Cottonwood Canyons.

Big Cottonwood Canyon and Little Cottonwood Canyon contain major ski areas and, therefore, experience the more severe transportation conditions. Emigration Canyon primarily serves residential traffic and Mill Creek Canyon serves mostly summer recreation activities and summer cabins. Although the annual average daily traffic in Emigration Canyon is the highest of these four canyons, it is apread relatively evenly over the year without severe seasonal peaks. Since the volumes in Emigration Canyon are oriented to the residences located in the Canyon, they diminish rather rapidly with distance from the Canyon mouth. This is not the case in either Big or Little Cottonwood Canyons since the main traffic generators are the ski areas located near the point of deepest penetration of each Canyon access road, causing the majority of traffic to traverse the entire length of the road. In addition, the traffic on these roads exhibits extreme peaking conditions on weekends during the winter when road conditions due to weather are normally the poorest.

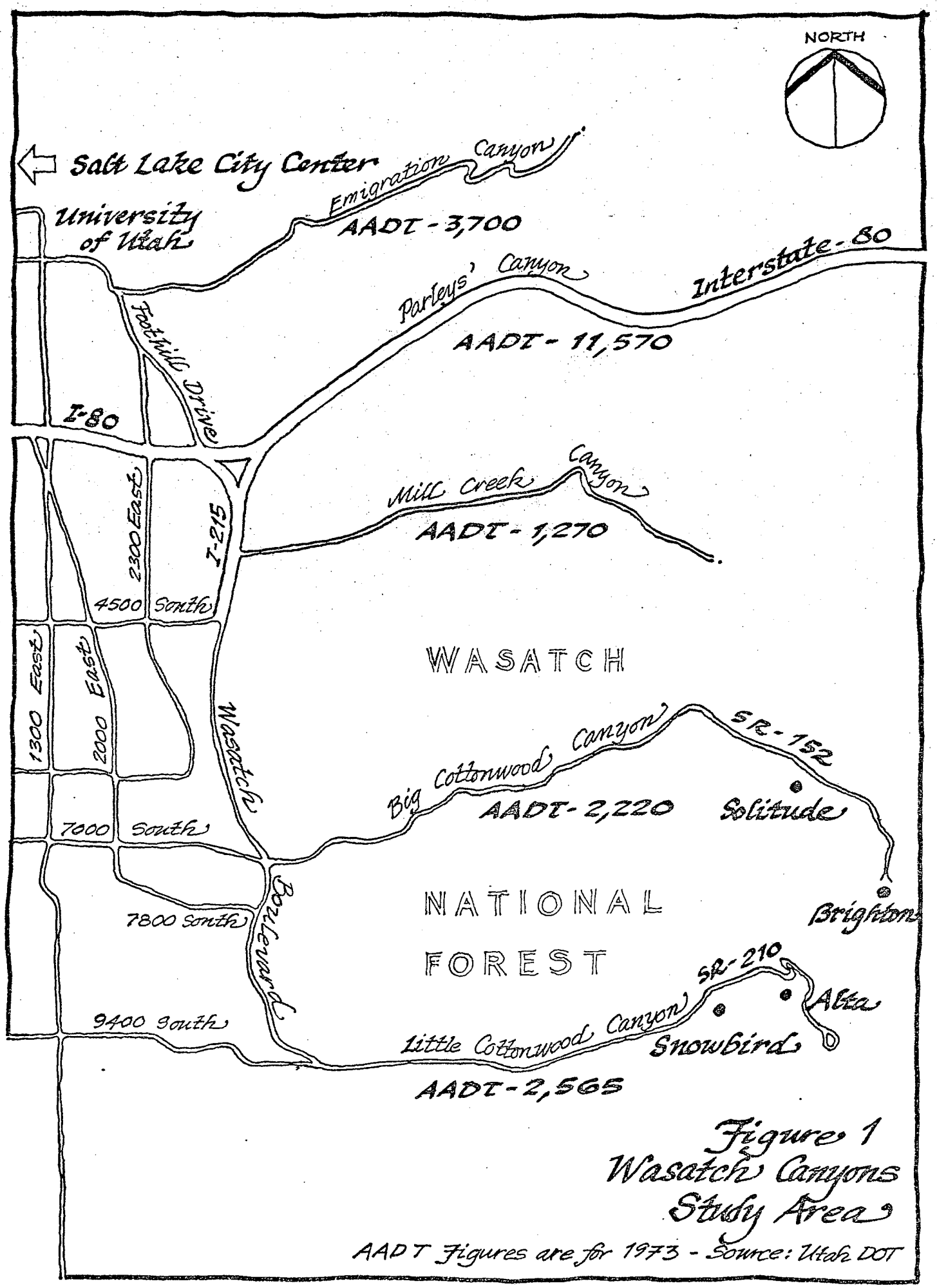

Figure 1
Wasatch Canyons
Study Area

AADT figures are for 1973 - Source: Utah DOT

Presently there is little transit service in any of these canyons. There is intercity bus service through Parleys Canyon on I-80 and some bus and limousine service from Salt Lake Valley areas to Park City. The Salt Lake Transportation Company has a franchise to provide service in Big and Little Cottonwood Canyons. In recent years, however, little service has been provided in Big Cottonwood Canyon, but both regular scheduled and charter service has been provided in Little Cottonwood Canyon. During the last ski season the Sandy, Alta, West Jordan Taxicab Company also provided shuttle service between the ski areas of Alta and Snowbird in Little Cottonwood Canyon.

Problem Identification

Current transportation problems in Big and Little Cottonwood Canyons can be summarized as follows:

1. The number of vehicles using the Canyon roads (especially Little Cottonwood) often exceeds the design capacity of the roadways.
2. Winter parking demand frequently exceeds parking capacity in the Canyons.
3. Weather conditions and avalanches create road safety problems and road closures.

While these problems exist to some degree in both Canyons, they are more severe in Little Cottonwood Canyon because of higher winter usage, more pronounced peaking of traffic volumes and a much greater threat of avalanches. Volumes in Little Cottonwood Canyon have been growing at a much greater rate in recent years subsequent to the opening of the Snowbird Resort.

The traffic volume problem stems not so much from the total vehicular traffic on these canyon roads, but from the fact that a disproportionate amount of the traffic is concentrated on winter weekends and during morning

and evening peak hours. Daily traffic volumes in Big Cottonwood Canyon are similar for summer and winter days. However, the volumes during the winter present a greater problem because of road conditions and the sharper peaking resulting from the desire of skiers to coordinate their travel with ski lift operating hours. In Little Cottonwood Canyon, traffic volumes during winter weekends are much greater than those experienced on summer weekends and in recent years have become considerably heavier than those experienced during the winter in Big Cottonwood Canyon.

The roads in both Canyons are relatively narrow, winding two-lane roads traversing rather steep grades over most of their lengths. Both Canyon roads have a paved width of approximately 22 feet and neither has any three-lane sections or designated turnouts to facilitate passing. These factors severely restrict the capacity of the Canyon roads to safely and efficiently handle peak traffic volumes.

In traffic engineering terms, the capacity of a highway is defined as the maximum volume of traffic which it can be expected to carry at a given level of service over a given period of time such as one hour or one day. The Utah State Department of Transportation (formerly the Department of Highways), in the Recreation Area Parking Study (December, 1973) estimated the theoretical capacity of Big and Little Cottonwood Canyon roads at 497 and 336 vehicles per hour in one direction, respectively. These estimates of theoretical capacity are presumably based on a level of service which the Department of Transportation feels represent acceptable conditions for recreation-oriented highways in mountainous terrain. Based on these estimates of hourly one-direction capacity, traffic counts during the 1973-74 ski season indicated that the capacity of Little Cottonwood Canyon Road (SR-210) was exceeded from two to four hours per day on most weekend days during the ski season.

The practical capacity of the Canyon roads may be somewhat higher than the Utah DOT figures indicate if a level of service more accurately reflecting the realities of traffic flow in the Canyons were used to calculate hourly roadway capacity. In any event, it is clear that the Cottonwood Canyon roads - especially Little Cottonwood Canyon - carry excessive traffic volumes which in turn create significant congestion, delay, and hazardous driving conditions.

In addition to the problems which the excessive peak-hour traffic volumes create for highway users, they also have serious negative impact on the environment of the Canyons. The vehicles using the Canyon roads produce air, noise, and even water pollution. This polluting is magnified by congestion which intensifies noise and increases the rate of pollutants emitted into the air per vehicle-mile of travel. In addition, a correlation has been established between traffic volumes and the coliform level in Canyon streams, a measure of water quality.(1)

The parking problem in the Canyons is also intensified during the ski season. Most skiers are in the Canyon for extended periods during the day and leave their vehicles parked for several hours. This high demand for parking during the ski season, and restrictive use of available facilities imposed by snow conditions, result in significant parking problems during winter weekends. The insufficiency of parking capacity, particularly in Little Cottonwood Canyon, results in parking in inappropriate or inadequate locations often infringing on the use of roads and driveways for traffic

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(1) Glenne, etal., "Water Pollution and Recreational Use in Little Cottonwood Canyon," College of Engineering, University of Utah; July 1973, p.45.

circulation. This is especially true near the mouth of the Canyon where vehicles are parked beside the road for carpooling and to facilitate hitchhiking.

The provision of adequate parking capacity in the Canyon presents significant problems. Surface parking facilities consume large amounts of space, and parking structures are an expensive means to resolve problems that occur only 40 to 50 days per year. Both types of facilities pose negative aesthetic impacts on the Canyon environment. Additionally, increased parking facilities represent increased runoff problems and potential for stream pollution.

Weather conditions and avalanches constitute both a safety problem and a convenience problem. Snow and icy conditions frequently make travel on the Canyon roads quite hazardous. This is accentuated by the presence of vehicles which are not equipped with snow tires or chains. This situation may be alleviated by strict enforcement of a new ordinance prohibiting use of Canyon roads during the winter season by ill-equipped or "non-winterized" vehicles.

The safety hazard posed by winter weather conditions on the steep, winding, narrow Canyon roads is evidenced by the Utah State Department of Highways accident statistics presented in Table 1. The accident rates reported for both Cottonwood Canyon roads are substantially higher than the overall rates for Federal Aid Secondary Highways in Utah. In addition to causing property damage, injuries, and deaths, accidents often create major traffic blockages, resulting in long delays to road users. Vehicles immobilized by ice or snow also can cause major traffic tie-ups. These tie-ups are sometimes extensive enough to result in visitors missing airplane connections.

TABLE 1

TRAFFIC ACCIDENTS AND ACCIDENT RATES

Location	Section Length (miles)	Year	Number of Accidents: Injury	Fatal	Property Damage	Total	Accident Rate*
Big Cottonwood Canyon Road (State Route 152) - Wasatch Forest Boundary to Brighton, including Brighton Loop	14.2	1972	20	1	49	70	9.26
		1973	14	1	40	55	6.77
		1974	38	1	45	84	10.42
Little Cottonwood Canyon Road (State Route 210) - Wasatch Forest Boundary to Alta	8.5	1972	26	0	47	73	17.70
		1973	16	2	39	57	8.22
		1974	23	0	39	62	8.40

Accident rates for all Federal Aid Secondary Highways in Utah for these years were:

1972	6.08
1973	5.99
1974	4.58

*Number of accidents per million vehicle miles.

Source: Utah Traffic Accidents and Accident Rates 1972, 1973, 1974. Utah State Department of Highways.

While avalanches are perceived to be a major hazard to road use, particularly in Little Cottonwood Canyon, they have in fact proven to be more of an inconvenience problem than a safety hazard. This is because avalanches are effectively controlled by the Forest Service through intentional initiation at predetermined times. However, even controlled initiation of avalanches often results in extensive road closures. Although efforts are made to minimize the impact of these closures, they represent a significant inconvenience to Canyon visitors.

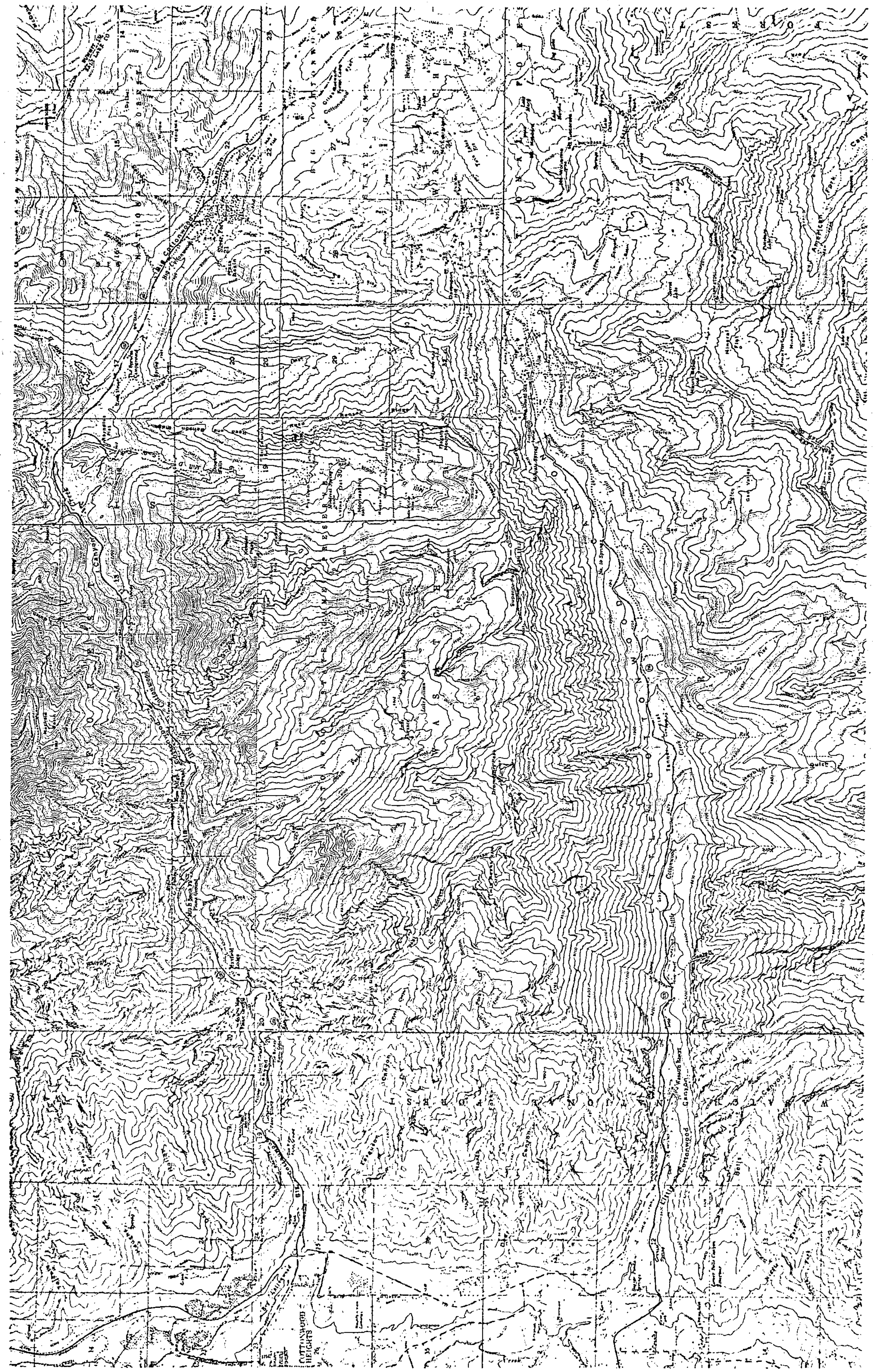
EXISTING CONDITIONS IN THE COTTONWOOD CANYONS

Canyon Topography

Big and Little Cottonwood Canyons are a part of the steep western slope of the Wasatch Mountains, formed by uplifting along the still-active Wasatch Fault. The Canyons of the Wasatch Range are generally steep, cut by streams and, more recently, formed and etched by glaciation. The Cottonwood Canyons are the most southerly of the major Wasatch Canyons with the County of Salt Lake. Figure 2 illustrates the location and geographical and topographical features of the Cottonwood Canyon area in the Wasatch National Forest.

Big Cottonwood Canyon is a major canyon of extensive length with a large number of lesser canyons branching off of it. Near its mouth, it is narrow with steep sides towering over 4,000 feet above the canyon floor. Farther into the canyon, the canyon floor widens out and the slopes on both sides become more gentle. The floor of the canyon has an elevation of about 5,000 feet at the canyon mouth and rises to an elevation of nearly 9,000 feet at the terminus of the canyon access road. The mountain peaks which form the canyon walls tower to well over 10,000 feet.

Little Cottonwood Canyon differs from Big Cottonwood Canyon in that it is more linear in nature with a wider floor and generally steeper sides. The floor of Little Cottonwood Canyon rises from an elevation of about 5,400 feet at the mouth to approximately 9,600 feet at the Albion Basin. Mountain peaks on either side rise to heights in excess of 11,000 feet. The north wall of the canyon is generally steeper than the south wall, which contains a greater number of minor canyons branching off of the main canyon.


COTTONWOOD HEIGHTS

Canyon Activities and Land Use

Just as the two Cottonwood Canyons differ in topography, so they differ in activities and land use. Activities in Little Cottonwood Canyon center about its two major ski areas and resorts at Alta and Snowbird. In contrast, the numerous picnic areas and private cabins located in Big Cottonwood Canyon generate as much summertime activity as do the ski resorts in the winter. The two ski areas in Little Cottonwood Canyon, Alta and Snowbird, are large in scale with each having lift capacities in excess of 5,000 skiers per hour. Both resorts are served by extensive lodging facilities, with capacities of 1,140 and 600 beds at Snowbird and Alta, respectively. These areas are nationally and even internationally known and attract skiers from all over the United States and many foreign countries. The two ski areas in Big Cottonwood Canyon, Brighton and Solitude, are somewhat smaller in scale, attracting primarily local and generally less proficient skiers. Lift capacity at Brighton is 3,650 skiers per hour. Solitude is undergoing a reconstruction program and did not operate last ski season nor is it expected to open this ski season. Only limited lodging facilities are available in the vicinity of the Big Cottonwood Canyon ski areas.

Ski area utilization differs between Big and Little Cottonwood Canyons, in terms of both intensity and type of use. During peak periods, the Little Cottonwood resorts have a combined skiing population approaching 10,000 skiers. Snowbird estimates that about 80 percent of its skiing population consists of "day skiers", which includes both local Utah residents and those non-local visitors who do not stay overnight at any of the Snowbird lodging facilities. Big Cottonwood Canyon (Brighton) has peak period skier populations in excess of 2,000, consisting almost entirely of day skiers. Lodging capacity at Brighton totals only 110 beds which, even during peak periods, are only some 60 percent utilized.

Little Cottonwood Canyon is characterized by the presence of a substantial year-round resident population, consisting primarily of employees of Snowbird and the Alta Lodges. During the ski season, it is estimated that Alta employs 375 people, while Snowbird employs about 750. Of these 1,125 employees, approximately 700 commute to their jobs daily from Salt Lake Valley residences, while the remainder are resident in the area.

Patterns of Travel

Generally, in determining patterns of travel, factors of interest include mode, time and direction of travel,and purpose of trip. In the case of the Cottonwood Canyons, the travel patterns are somewhat simplified as there is little variation in mode or direction. Data from the 1972-73 Utah Winter Sports Ski Industry Study(2) indicate that over 98 percent of Utah residents travel to ski areas by car, and over 86 percent of non-resident skiers used a car (either private or rental) for ski area access from their Utah location. Since Snowbird reports that over 90 percent of their lodgers utilize a mode other than private automobile to reach the lodge, it can be assumed that ski area lodgers represent the major users of other modes for ski area access. The ski area lodgers generally stay an average of 4 or 5 days, and therefore do not travel the Canyon roads on a daily basis. This means that in excess of 95 percent of the people using the Canyon road on a given day would be travelling by car.

Direction is not a significant variable in Canyon travel except as it relates to time. Conventional vehicular travel is limited by the road network to up and down the canyons. Through travel is possible only by con-

(2) "1972-73 Utah Winter Sports-Ski Industry Study," Utah State University.

ventional road vehicles in Big Cottonwood Canyon during the summertime when the unimproved road to Park City is open. As might be expected, this constitutes a very small percentage of total Canyon travel. Directional movement of vehicles is thus largely limited to up the Canyon and back down the Canyon, with upward movements predominating in the morning hours and down-Canyon flow predominating in the afternoon. Responses to the postcard survey of persons entering the Cottonwood Canyons, conducted by the Utah State Department of Highways (now the Department of Transportation) in February, 1973, illustrate the dominance of the ski areas as destinations. Over 90.3 percent of respondents in Big Cottonwood Canyon were destined for Brighton (57.6 percent) or Solitude (32.7 percent), and 97.2 percent of respondents in Little Cottonwood Canyon were destined for Alta (54.4 percent) or Snowbird (42.8 percent). This postcard survey was conducted in conjunction with a Canyon study coordinated by the Wasatch Front Regional Council.

Because of the dominance of the automobile as a travel mode, traffic volumes on the Canyon roads, as described in the next section, provide an accurate representation of the time variations over the course of a day for Canyon travel. Average daily traffic (ADT) volumes exhibit a strong seasonal variation, with volumes in Little Cottonwood Canyon showing much greater variation from month-to-month than the volumes in Big Cottonwood Canyon. ADT volumes in Little Cottonwood Canyon during peak winter months are nearly twice as high as monthly ADT volumes during the summer; however, in Big Cottonwood Canyon the highest monthly ADT volumes occur during the summer months. More pronounced than the seasonal variation is the variation by day of the week and hour of the day. Weekend volumes are generally much higher than weekday volumes with more pronounced difference in the winter months. The hourly pattern is very pronounced during the winter months, reflecting the ski lift operating hours. Traffic volumes are extremely heavy from 9

to 11 a.m. and 4 to 6 p.m., during weekends in particular. The heaviest morning volumes generally occur on Saturdays, with the heaviest p.m. volumes usually occuring on Sunday afternoons.

Directional traffic counts taken in February, 1973, by the State Department of Highways, indicate over 90 percent of the morning peak hour traffic is in the in-bound (up Canyon) direction. Unfortunately, the counts were terminated at 5 p.m. during the middle of the p.m. peak, so the exact split during the p.m. peak is not determinable. However, the trend indicates that p.m. peak hour traffic would have shown a directional split close to 90 percent out-bound (down Canyon).

In the case of the Cottonwood Canyons during the winter months, determining trip purpose is really a matter of identifying the trip makers. Responses to the February postcard survey confirm that the predominant trip purpose of Canyon travelers (69.2 percent in Big Cottonwood Canyon and 76.0 percent in Little Cottonwood Canyon) is skiing. During the winter months, over 90 percent of the travel on Canyon road is by skiers and Canyon employees. For travel pattern purposes, skiers are best divided into three types:

1. Utah residents - almost all resident skiers are day skiers who travel to and from the ski area on the day they ski, and 98 percent of these use automobiles as their access mode;

2. Non-resident day skiers - these are non-residents of Utah who generally stay in Salt Lake Valley and travel to the ski areas each day they ski. Most of these skiers use private automobiles or rental cars as their access mode, but a significant number staying in the downtown area do use buses to Snowbird and Alta;

3. Ski area lodgers - these are primarily non-resident skiers who stay in the lodges at Alta and Snowbird and do not travel up and down the Canyon on a daily basis. The majority of these seem to utilize taxis, limos, buses, or helicopters to reach the ski areas.

Employees in the Canyons constitute a significant portion of the travel volumes, particularly in Little Cottonwood Canyon. Work was the stated trip purpose of 6.3 percent of survey respondents in Big Cottonwood Canyon and 12.5 percent of respondents in Little Cottonwood Canyon. During the winter season, there are some 1,125 people employed at Snowbird and Alta. Of these, 425 live in the Canyon, and about 700 commute on a daily basis. Employees living in the Canyon make only occasional trips up and down the Canyon, but those commuting make a round trip every day.

Canyon Traffic

Average daily traffic (ADT) has increased dramatically in both of the Cottonwood Canyons in recent years, as shown by the annual ADT volumes in Table 2. The presence of permanent State Highway Department counting stations on both of the Canyon roads provides almost continuous records of hourly traffic. The average daily traffic volumes recorded by month in 1973, presented in Table 2, indicate the strong seasonal variation in traffic flow in the Canyons. Monthly ADT volumes in Big Cottonwood Canyon ranged from a low of 1,240 in April to a high of 3,448 in July. The lowest monthly ADT volume for Little Cottonwood Canyon was 1,430, recorded in May, and the highest monthly ADT volume was 3,698, recorded in February. These high and low monthly ADT's illustrate the seasonal differences in use of the two Canyons: Big Cottonwood Canyon receiving its highest use during the summer months and Little Cottonwood Canyon experiencing its greatest use during the winter ski season.

Even more dramatic than the seasonal variation in traffic volumes is the variation by the day of the week and hour of the day. This is illustrated by Figure 3 which shows daily traffic volumes during the 1973-74 ski season for

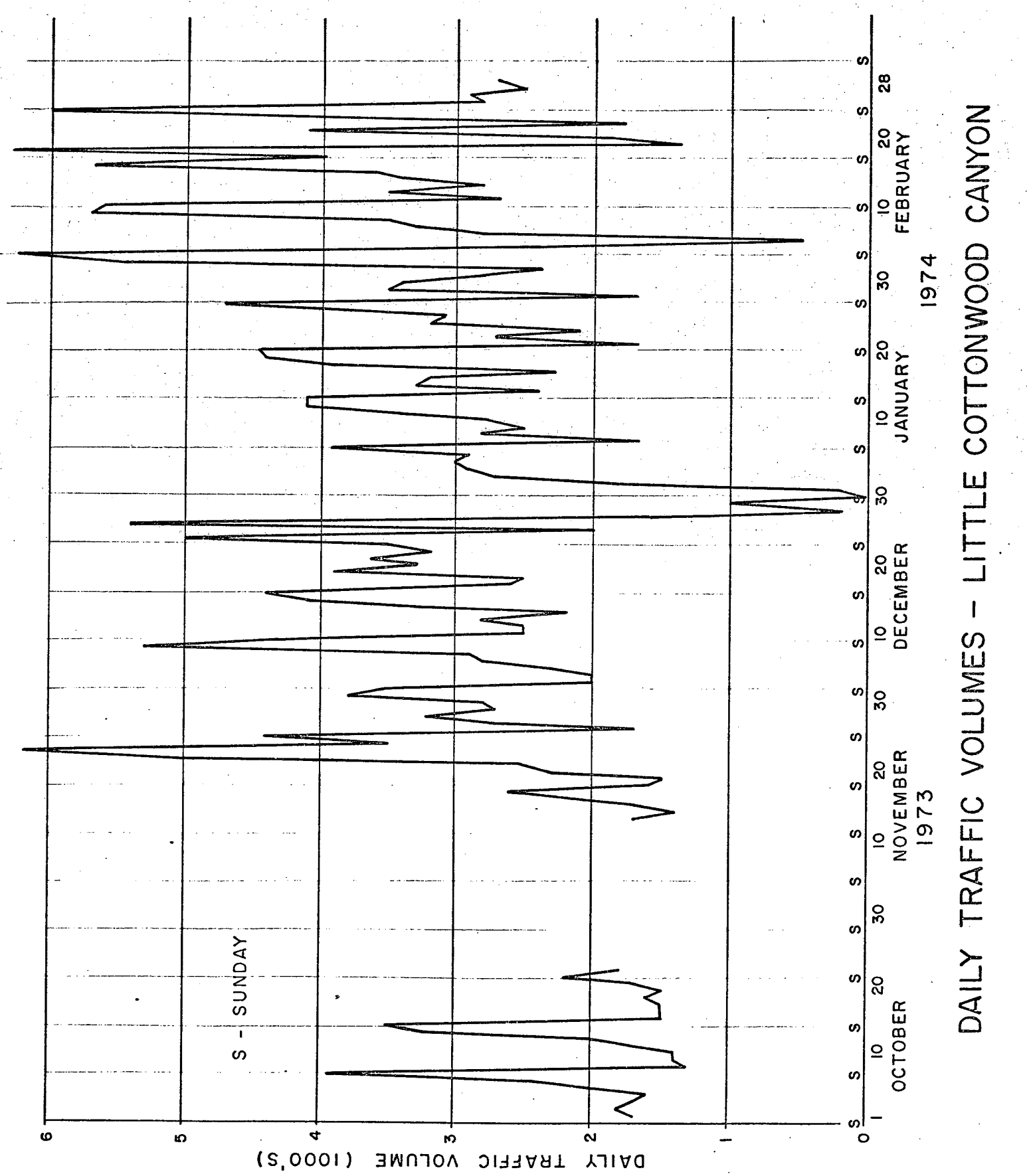
TABLE 2

AVERAGE DAILY TRAFFIC VOLUMES

YEAR	BIG COTTONWOOD CANYON ROAD (U-152)	LITTLE COTTONWOOD CANYON ROAD (U-210)
1967	1544	746
1968	1589	862
1969	1633	1105
1970	2211	1160
1971	2097	1393
1972	2236	2233
1973	2213	2565
1973 MONTH		
January	2065	3533
February	2257	3698
March	1850	3523
April	1240	2778
May	1755	1430
June	2671	1796
July	3448	2130
August	3124	2278
September	2217	2071
October	1960	1972
November	1748	2731
December	2221	2836

Source: Utah State Department of Transportation, Planning Statistics Section

Figure 3


DAILY TRAFFIC VOLUMES - LITTLE COTTONWOOD CANYON
DAILY TRAFFIC VOLUME (1000'S)
0
1
2
3
4
5
6
S - SUNDAY
OCTOBER
NOVEMBER
DECEMBER
JANUARY
FEBRUARY
1973
1974

Little Cottonwood Canyon and by Table 3 which gives the hourly volumes recorded during a typical week of that season. The magnitude of the variation in daily traffic volumes is illustrated by the fact that while the annual ADT volume in Little Cottonwood Canyon for 1973 was 2,565 vehicles, there were at least 10 days during the 1973-74 ski season on which the volume was over 5,000 and the peak daily volume (recorded February 2, 1974) was 6,515.

Examination of the highest 30 hourly volumes recorded at each of the permanent counting stations in the Cottonwood Canyons reveals some interesting differences. The highest peak hour recorded in Big Cottonwood Canyon in 1973 was 883 and the 30th highest volume (often used as a basis for highway design) was 596. In Little Cottonwood Canyon, the highest peak hour was 1,292 and the 30th highest hourly volume was 724. Of the 30 highest hours in Big Cottonwood Canyon, 12 were on Sundays and 9 were on Wednesdays, with 29 occurring in the p.m., mostly in the hour from 4 to 5 p.m., and 13 of the highest 30 hourly volumes occurred in July. In Little Cottonwood Canyon, 12 of the highest 30 hourly volumes in 1973 occurred on Saturdays, and 8 were on Mondays, 25 occurring in the p.m., mostly during the hour from 5 to 6 p.m. The heavy concentration of use during the winter ski season in Little Cottonwood Canyon illustrated by the fact that 19 of the 30 highest peak hours occurred during the months of January and February. The higher traffic volumes and concentration of daily and hourly peaks during the winter months in Little Cottonwood Canyon illustrates the need to focus the attention of the Immediate Action Program on the transportation requirements of Little Cottonwood Canyon.

Problems presented by the magnitude of the peak hourly volumes occurring during the ski season are accentuated by the heavy directional nature of these

TABLE 3

HOURLY TRAFFIC VOLUMES
LITTLE COTTONWOOD CANYON ROAD

TYPICAL WINTER WEEK
January 20-26, 1974

Hour	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
12- 1 am	53	18	8	23	25	25	47
1- 2	49	13	5	13	17	26	36
2- 3	10	4	2	1	2	5	7
3- 4	6			2	4	4	2
4- 5	3	2			3	1	4
5- 6	8	9	7	9	5	6	8
6- 7	9	16	9	12	20	14	12
7- 8	30	49	56	41	29	49	21
8- 9	154	79	98	96	141	139	160
9-10	458	96	232	113	283	289	395
10-11	439	258	265	202	339	264	340
11-12	303	157	188	132	191	235	257
12- 1 pm	306	130	211	149	270	245	259
1- 2	340	121	245	183	256	246	241
2- 3	348	75	130	116	169	196	171
3- 4	348	80	145	104	191	229	264
4- 5	463	122	287	169	360	153	460
5- 6	674	241	448	369	464	315	487
6- 7	243	92	140	145	134	149	170
7- 8	117	44	62	77	81	225	102
8- 9	53	37	50	53	66	109	103
9-10	50	22	46	38	60	66	78
10-11	46	24	40	45	69	67	65
11-12	23	23	40	45	41	54	62
Total	4533	1712	2714	2137	3230	3111	3751

Source: Utah State Department of Transportation, Planning Statistics Section

volumes. This is illustrated by the directional volumes given in Table 4, which were recorded during the Recreation Area Parking Study conducted by the Utah State Department of Highways in 1973. It can be seen from these directional volumes that during peak hours, as much as 80 to 90 percent of the traffic may be flowing in one direction: in-bound during the a.m. peak hours and out-bound during the p.m. peak hours. This unusually heavy directionality in the traffic flow reduces the total volume which the road might otherwise accommodate given a more even directional split and, therefore, compounds the congestion problem.

Transit Service

Only limited transit service has been available in recent years in the Cottonwood Canyons. The Salt Lake Transportation Company is franchised to operate regularly scheduled service in both of the Cottonwood Canyons, and Lewis Bros.' Stages is franchised to serve between the Cottonwood Canyons and Park City. Due to a Public Services Commission ruling permitting the operator to cancel trips not attracting at least six riders, scheduled service in Big Cottonwood Canyon has been practically non-existent. During the 1974-75 ski season, the Salt Lake Transportation Company operated four regularly scheduled round-trips per day between the Salt Lake International Airport and the Snowbird and Alta ski areas. These runs also served the downtown bus terminal and other in-route locations. Lewis Bros.' Stages operated two regularly scheduled round-trips per day between Park City and Alta/Snowbird during the last ski season. Transit fares (one way) for the 1974-75 season were as follows:

- Airport to Alta/Snowbird	$5.00
- Downtown Salt Lake City to Alta/Snowbird	$1.75
- University of Utah to Alta/Snowbird	$1.25
- Park City to Alta/Snowbird	$4.00

TABLE 4

HOURLY DIRECTIONAL VOLUMES

Hour	Wednesday 2/14/73 Inbound	Wednesday 2/14/73 Outbound	Saturday 2/17/73 Inbound	Saturday 2/17/73 Outbound
		BIG COTTONWOOD CANYON		
8- 9 am	49	9	367	12
9-10	122	15	686	60
10-11	71	17	209	92
11-12	50	11	152	56
12- 1 pm	109	24	187	183
1- 2	59	49	193	206
2- 3	37	72	120	173
3- 4	26	100	130	263
4- 5	26	111	125	381
Total*	549	408	2,169	1,426
		LITTLE COTTONWOOD CANYON		
8- 9 am	183	17	521	28
9-10	338	35	636	89
10-11	210	34	388	82
11-12	165	34	240	70
12- 1 pm	214	38	284	103
1- 2	189	87	211	173
2- 3	59	146	90	219
3- 4	50	202	135	373
4- 5	53	503	142	632
Total*	1,461	1,096	2,647	1,769

*Total volumes for 9-hour period (8:00 a.m.-5:00 p.m.). This period generally includes 70-75 percent of the daily traffic volumes in the Canyons during the winter season.

Source: Recreation Area Parking Study, Phase 1, Data Collection, Utah State Department of Highways, December 1973.

During the early part of the ski season, the Salt Lake Transportation Company also provided shuttle service between Alta and Snowbird, operating on a 20 to 30 minute headway. When a competing service was initiated by the Sandy, Alta, West Jordan Taxicab Company, this shuttle service was abandoned by Salt Lake Transportation Company.

In addition to the regularly scheduled transit service, charter bus, limousine and taxi service is provided to both Canyons. Limousine service to the Snowbird and Alta Ski Resorts is available from the airport and from downtown Salt Lake at posted fares based on the number of passengers.

The Salt Lake Transportation Company reports that patronage last year on the Airport/Downtown to Alta/Snowbird service was 500 - 800 passengers per week. About 20 percent of the ski area transit trips are to or from the airport, about 60 percent are to or from downtown, and about 20 percent are to or from intermediate points such as the University of Utah. During the 1973-74 season when the Alta/Snowbird shuttle was operated the entire season, a total of 18,100 passengers (about 150 passengers per day) were carried on the shuttle service.

Although the schedule of transit service to and between ski areas in the Wasatch Front has not been published for the 1975-76 ski season, it is expected that schedules will generally parallel those from the 1974-75 season.

INSTITUTIONAL CONSTRAINTS

Institutional constraints encompass those legal and jurisdictional relationships which might constrain Immediate Action Plan solutions to transportation problems. Since the most urgent transportation problems exist in Little Cottonwood Canyon, Immediate Action Plan solutions focus on that Canyon. The institutional constraints discussed here are those existing in Little Cottonwood Canyon.

Traffic Management

Institutional constraints which might affect traffic management in Little Cottonwood Canyon are primarily those of a jurisdictional nature. Little Cottonwood Canyon Road is State Highway U-210 and is a part of the Federal Aid Secondary System. This means that any operational strategies must meet with State and Federal approval and conform with State and Federal Highway Statutes. Most of the length of Little Cottonwood Canyon Road is within the unincorporated area of Salt Lake County, but a portion is within the limits of the Town of Alta. Since most of the land in Little Cottonwood Canyon is part of the Wasatch National Forest and the Forest Service is responsible for avalanche control, Forest Service policies also represent a constraint in traffic management for Little Cottonwood Canyon Road.

Responsibility for road maintenance and improvements for Little Cottonwood Canyon Road rests with the State Highway Department. Traffic control and safety on Little Cottonwood Canyon Road is the responsibility of the Sheriff's Department of Salt Lake County and the Marshall of the Town of Alta. There are four control gates located on the main road and one on the bypass road between Alta and Snowbird. Gate No. 1 near the mouth of the Canyon is controlled by the Sheriff's Department. Gate No. 2, just

down the Canyon from Snowbird, and Gate No. 3, located on the bypass road, are controlled by Snowbird. Gates No. 4 and 5, located on the main road between Alta and Snowbird, are controlled by the Town of Alta. Road closures for avalanche control are determined by the Forest Service.

In 1972 the Little Cottonwood Canyon Road Committee was formed to provide a means of coordinating road control and maintenance. This Committee meets periodically and consists of representatives of the Utah State Department of Highways, the State Highway Patrol, the Salt Lake County Sheriff's Department, United States Forest Service, the Town of Alta, Alta Ski Corporation, Snowbird Corporation, and Alta Central. Alta Central is a communications center established to control road operations during the winter season. Effective implementation of traffic management strategies as a part of the Immediate Action Plan would require coordination through Alta Central and concurrence of the agencies involved.

Public Transportation Services

Constraints pertaining to public transportation services in Little Cottonwood Canyon consist primarily of transportation franchises granted by the Utah Public Services Commission. The Salt Lake Transportation Company has franchise rights to operate transit service in Big and Little Cottonwood Canyons. Additionally, by statute, any taxicab company franchised to operate within a city can also operate within any area within 15 miles of that city. This permits the Sandy, Alta, and West Jordan Taxicab Company to operate shuttle services between Alta and Snowbird.

The Utah Transit Authority, as a public transit agency receiving Federal subsidies, is prohibited by statute from competing with a franchised private carrier without properly compensating that carrier for any losses

incurred. Operation of competing service might result in the necessity for the Utah Transit Authority to purchase the franchised carrier.

Section 11-20-17 of the Utah Public Transit District Act prohibits the Utah Transit Authority from establishing any service or facilities, directly or indirectly, which may "divert, lessen or compete for the patronage or revenues of an existing system of a publicly or privately owned public utility furnishing like services...." Although Section 11-20-34 of the same legislation allows the UTA to "cooperate with and enter into agreements with...,any public agency...,to establish transit facilities", it is probable that any contract service provided by UTA in competition with an existing transit system, even through an arrangement with a public entity, would violate the provisions of Section 11-20-17 prohibiting "indirect" provision of competing services. Thus, unless it could be shown that the establishment of service to Little Cottonwood Canyon by UTA would in no way divert, lessen or compete for the patronage and revenues of the Salt Lake Transportation Company, it is likely that a court resolution for adequate and just compensation would be required to permit UTA to operate public transit service to and within the ski resort areas.

OPPORTUNITIES FOR IMMEDIATE ACTION

The primary objective of any strategy for improving Canyon transportation in the immediate future should be to insure that a particular strategy, when implemented, is consistent with and a logical forerunner to any subsequent improvement contemplated for implementation. Thus, an Immediate Action Program should embrace a set of measures which will seek to avoid conflicts with concepts envisioned for future development. Since the long-range goal for transportation improvement in the Wasatch Canyons - particularly the Cottonwood Canyons - has been established through widespread consensus to include greater reliance on mass movement schemes, it is the intent of the recommendations discussed in this Working Paper to proceed toward that objective. This does not imply that the Immediate Action Program can, or should, be directed toward the immediate implementation of an extensive transit scheme; rather, the movement in this direction should proceed through a series of logical steps which can be evaluated concurrently with their implementation. The current barriers - both physical and institutional - which effectively constrain extensive transit improvements will need to be dealt with in rational sequence.

The recommendations for immediate action fall into two areas: traffic control strategies and transit service improvements. While certain programs for traffic management on Canyon roads can improve safety and capacity, most such programs, to be effective, require the provision of supplemental means for ski area access. For example, better coordination of roadway maintenance and snow removal functions can improve safety for private vehicles, but better enforcement of parking prohibitions at the resort areas requires either the development of more legal parking capacity or the elimination of the need

to park as many vehicles as currently seek parking within the Canyon. Such problems associated with certain improvement programs revolve around the question of the future role public transportation is to play in the Cottonwood Canyons. Until this issue is resolved, implementation of many programs with great potential to improve transportation and access to the ski areas is not practical.

The dilemma of the Immediate Action Program is this: The more extensive the improvements designed to facilitate private vehicular movement in the Canyons, the less attractive future transit options will appear. Thus, if institutional and physical constraints limit the immediate implementation of acceptable levels of transit service, the alternative does not necessarily include the adoption of measures to ease the current problems caused by almost total reliance on private vehicles for access. Such measures, in effect, may well conflict with the perceived goal to restrict the influence of private vehicles in the Canyons. Thus, the strategies discussed for traffic management must be considered in this context: What level of expenditure should be allocated to improve private vehicle access in advance of the resolution of questions regarding the future role of public transit in the Canyons?

Perhaps the most useful purpose of this Immediate Action Program might be to seek a mechanism through which the issue of public transit's role in the Canyons can be resolved. Once it is clear whether privately-owned and currently franchised transit operators will be expected to maintain a desired level of public access to and within the Cottonwood Canyons, or whether this function will be transferred to the Utah Transit Authority, a Short-Range and Long-Range Plan for Transit can be meaningfully developed. Thus, the recommendations discussed in this section are designed to (1) improve - in

the short run - traffic safety and reduce excessive delay on the Canyon roads without actively encouraging use of private vehicles by vastly improving private vehicular access, and (2) to suggest a trial program whereby UTA can provide supplemental service to Little Cottonwood Canyon to both fulfill a needed service vacuum and to set the stage for the early resolution of the role of public transit in the Canyons of Salt Lake County.

Since this transportation study is proceeding concurrently with the County's "208" Study and other Canyon area planning activities, it is clear that a number of issues cannot be resolved until the ultimate question of allowable future Canyon development is resolved. Other related issues such as the effect of Canyon use on water quality and the influence of automobile travel and parking on fragile resource areas also clearly affect transportation planning. However, until such knowledge is gained through parallel studies, immediate action strategies are constrained by the following issues:

- No extensive construction or large-scale property acquisition is recommended at this time (e.g., parking structures, snow sheds, road widening, etc.). Such measures may be recommended in a longer range plan, pending "208" Study results.
- No development of surface parking in Canyon watershed areas or within proximity of wells is recommended in this program.
- No comprehensive transit plan is recommended at this time; however, a first stage program is recommended to hasten the decision on ultimate responsibility for transit management in the Canyons.

Traffic Control Strategies

The primary objectives in developing immediate action traffic control strategies for the Cottonwood Canyon roads are to increase safety and reduce delay. Reduction of delay is focused not so much upon delay incurred when volumes exceed the estimated roadway capacity during peak hours on winter weekends, but upon delay which results from road closures and traffic blockages

which occur as the result of accidents or immobilization of vehicles during adverse weather conditions.

The mechanism readily available for immediate action implementation with the greatest potential for improving safety and reducing the incidents of road blockages is the ordinance requiring vehicles to be equipped with snow-tires or have chains available in order to use the Canyon road during the winter season. Strict enforcement of this ordinance would eliminate ill-equipped vehicles from using Canyon roads during adverse weather conditions. Because many of these adverse weather conditions occur after vehicles are already in the Canyon, if this ordinance is to be truly effective, it would have to be enforced at all times, even when the road is clear. Effective enforcement of this ordinance would require inspection of vehicles at the Canyon mouths. Some physical improvement such as paving of the road shoulders might be necessary to facilitate vehicle inspection and permit turnback of unacceptable vehicles. Enforcement of this ordinance would also require determination by the State Department of Highways of what constitutes an acceptable snowtire or traction aid such as tire chains. If such determination has not been made by the Department of Highways, it might be necessary to collect information from other states or initiate a test program of available devices to delineate those which provide an acceptable level of traction for snow and ice conditions encountered on Canyon roads.

Because both Cottonwood Canyon roads are State highways, enforcement of an ordinance to improve highway safety would be the responsibility of the State Highway Patrol. However, the Highway Patrol could authorize the County Sheriff's Department to enforce this ordinance along with their present road control duties. It must be stressed that such an ordinance is only as

effective as its enforcement. This means that not only must possession of chains or traction aids be enforced, but also their use when conditions warrant. Therefore, inspection at the upper end of the Canyons might be necessary at times to ensure that departing vehicles are using required traction aids.

While the effectiveness of the snowtire/chain ordinance will be determined by the enforcement, the cost of continuous enforcement may be more than could be justified by the improvement obtained. Therefore, an enforcement program which produces maximum effectiveness at minimum cost must be employed. Such a program might involve continuous enforcement for the first two or three weeks of the ski season until a compliance habit is established. Enforcement thereafter might consist of occasional spot inspections, particularly on heavy weekends. Such enforcement would probably require the issuance of substantial fines for non-compliance in order to be effective. An information program will be needed consisting of signing on the roads, distribution of handbills, tourist information centers coordinated with existing booths at the airport and at hotels and motels, and a media campaign beginning some weeks prior to the ski season.

Another immediate action measure which has considerable potential for improving traffic flow on the Canyon roads is strict enforcement of parking prohibitions. Cars parked illegally on the road shoulders, both at the mouth of the Canyons and in the vicinity of the ski areas, interfere with road clearing operations and traffic movements. However, significant barriers exist to satisfactory enforcement of parking prohibitions. Elimination of roadside parking at the Canyon mouth could increase the traffic volumes on the Canyon roads by reducing the opportunities for carpooling. Strict enforcement of parking prohibitions in the vicinity of the ski areas would

require imposition of substantial fines with an efficient collection mechanism in order to be effective. Substantial vehicle towing capabilities and facilities for vehicle impoundment would also be necessary for effective enforcement. It is clear that having driven all the way to the resort areas and finding no legal parking available, skiers would not be inclined to comply with parking prohibitions unless the consequences were harsh. Therefore, effective and reasonable enforcement of parking prohibitions in the ski areas might logically necessitate prohibition of access to the Canyon by private vehicles once available parking facilities are filled.

It follows that prohibition of private vehicle access would only be reasonable if an alternative such as park-and-ride lots with bus service to the ski areas is provided. Since the construction of adequate alternative facilities and the provision of full-scale transit service are improvements relegated by scope and constraints to implementation subsequent to this Immediate Action Program, it is doubtful whether strict enforcement of parking prohibitions can reasonably be included as an immediate action measure. Some improvements in parking conditions, however, may be possible if the limited transit service suggested in the following section is implemented.

Improvement in road maintenance operations and coordination of road control has substantial potential for reducing the impact of weather conditions and avalanches on road safety and user convenience. Delays in snow plowing and sanding operations in response to snow and ice conditions have occurred because of inadequate availability of equipment, crews and materials. Problems have also existed with the coordination of road closure and clearance activities for avalanche control. These problems and inadequacies have too often resulted in lengthy road closures and hazardous road conditions remaining uncorrected for excessive periods of time.

Alta Central has been established as the communications mechanism for controlling and coordinating road operations. In order for this control and coordination to be effective, compliance by all involved agencies, i.e. Department of Transportation, the Highway Patrol, the Sheriff's Department, Forest Service, the Alta Marshall and Snowbird Corporation is essential. Needs for road closures or maintenance operations must be reported immediately and directly to Alta Central so that requests for such service can be initiated by Alta Central. Opening or closure of the five road control gates should be cleared through and authorized by Alta Central.

Availability of road maintenance equipment and crews has been limited by the Department of Transportation's budget constraints. While road maintenance is the responsibility of the State, it is clearly in the interest of the ski areas and lodges to contribute to increasing the availability of equipment and crews. Such contribution might be in the form of making ski area plows and sanders available for road maintenance use. Authorization of such use by the State Department of Highways could greatly reduce response time for road maintenance operations when State crews or equipment are not readily available. Such use would increase the need for coordination of maintenance operations by Alta Central. The efficiency of maintenance operations could be increased by adequate stockpiling of sand and salting materials at the upper end of the Canyon road.

Initiation of one-way road operations during peak hours (only up-Canyon travel being permitted during the morning peak and down-Canyon travel during the evening peak) has great potential for increasing road capacities but little justification as a safety measure. About 40 percent of the accidents on Little Cottonwood Canyon road consist of vehicles running off the road and another 15 percent of the accidents are of the

rear end variety. These types of accidents plus those involving the sideswiping of vehicles proceeding in the same direction, overturning of vehicles in the roadway, and striking of fixed objects quite possibly might be increased by one-way operations due to increased speeds and traffic volumes. Head-on accidents and sideswipes of vehicles proceeding in opposite directions constitute less than 20 percent of the accidents; therefore, potential accident reduction by one-way operation is not likely to be sufficient to offset the increased risk of serious head-on collisions from non-compliance with one-way restrictions.

The increased roadway capacities provided by one-way operation, while potentially effective in reducing congestion, might well be counterproductive. The increased accessibility provided on peak days could result in greater demands for parking in the vicinity of the ski areas and, therefore, more illegal or improper parking. The increased volumes of traffic and numbers of vehicles parked can be expected to have serious negative impacts on the Canyon's environment. In addition, increasing the roadway capacity during peak hours can be expected to result in more severe peaking of travel demand. In general, one-way operation can increase road capacity and reduce driver frustration, but it may well be inappropriate to the Little Cottonwood Canyon situation due to the serious insufficiency of legal parking capacity at the resort areas. Unless terminal parking capacity were to be expanded - in definite conflict with ultimate Canyon goals - one-way peak-hour operation may result in only minor or even no real improvement in overall access.

A far better method of reducing traffic congestion is the institution of measures to spread traffic volumes. These types of measures operate on activity demands rather than on transportation capacity. Road capacities

are exceeded only during peak hours on peak weekends. These peak hours are dictated primarily by ski lift operating hours and policies and employee commuting; the peak weekends are generally confined largely to the months of December, January and February. Measures are needed which could encourage use of the ski areas during other months, or weekdays, and spread the use over the hours of the day as much as possible. Several such measures were among recommendations made by the Governor's Task Force on Mass Transportation System for Skiers and reproduced in Table 5.

The recommendations presented in Table 5 focus on increasing the use of mass transit, as that was the objective. However, they do embody some useful concepts in spreading use of the ski areas, particularly over the hours of the day, which would have beneficial effects on traffic conditions by reducing peaking. The recommendation with greatest potential for spreading daily use would seem to be that of the "per ride" ticket. If skiers could purchase tickets for just the number of runs they wanted to make instead of paying a flat daily rate, they would not feel obligated to ski all day to get their money's worth. This would encourage more people to schedule their skiing so that they could come and go during off-peak periods. Extension of ski lift operating hours to the extent possible consistent with safety concerns could also be helpful in reducing peaking of daily traffic volumes.

While there appears to be some potential for spreading of volumes over the hours of the day, there is much greater potential for spreading volumes over the days of the week and the months of the season. As suggested by the Governor's Task Force, ski resorts and hotel/motel operators should offer and promote attractive mid-week packages. Ski lifts could

TABLE 5

RECOMMENDATIONS TO INCREASE RIDERSHIP

(1) Ski areas provide lockers for security. A nominal rental of 25 cents per day should be charged.

(2) Ski lift companies begin offering on a wide spread basis the "per ride" ticket. The costs should be adjusted to encourage this ticket.

(3) Ski schools vary their starting times, having sessions start in mid-morning and mid-aftertoon as well as the historic morning-noon schedules. This will help in spreading out the demand, allowing the bus concept to work better.

(4) Public Schools should make part of the curriculum and give credit for a day of skiing mid-week.

(5) Ski resorts and hotel-motel operators must encourage mid-week packages. Currently the marketing effort is aimed at Sunday arrival Saturday departure, increasing the demand for transportation on the weekend. Since the current systems function very adequately in the mid-week, we need to force demand for transportation over into that portion reducing it at the critical time, the weekend.

(6) Ski lift companies continue to give the "wooden nickel" to bus riders, allowing a reduction in the pass cost (on a day pass) of 50 cents during the weekdays and $1.00 on the weekends.

(7) Ski lift companies begin operation of the ski lifts at 8:15 a.m. Allowing earlier skiers to use the hills at the earliest time of the day consistent with safety concerns. This will tend to spread demand for transportation also. The February survey showed that peak traffic times were 8-10 a.m., with the largest demand between 9-10 a.m. This makes sense in that ski lifts start around 9:00 - 9:30 a.m. It is the committee's view that "hot dogs", younger skiers, would anxiously use the bus if they could get a break on the cost of their pass and as well, ski longer during a day. Also, the opening of the lifts earlier will tend to spread out the "go home" times too. The February survey showed that 4-5 p.m. was the heaviest go home time. That demand could be spread out since many skiers who began earlier will tire sooner.

Source: Governor's Task Force on Mass Transportation System for Skiers

substantially reduce weekday lift ticket prices relative to weekend and holiday prices. Higher room rates could be charged during the peak demand months and weeks to permit even more attractive prices to be offered during lower demand periods.

While peak period pricing is already employed to some extent, it is reasonable to assume that stiffer cost penalties (or more attractive cost rewards) would have an increased effect of spreading demand. Most importantly, measures designed to alter the demand profile - as contrasted to measures designed to provide additional automobile capacity - are more in keeping with the basic immediate action objective to avoid the implementation of measures which might work against future transit attractiveness.

Transit Service

The basic objectives of immediate transit service improvement in the Cottonwood Canyons are to (1) provide limited supplemental service by the Utah Transit Authority (UTA) to temporarily ease resort area parking congestion on weekends; and (2) to begin the process of structuring a definitive future role forpublic transportation in the Canyons. The Immediate Action Program concentrates, in this regard, on Little Cottonwood Canyon since its transit-related requirements are much more pronounced than those of the other Canyons.

Several constraints affect the potential for establishing immediate transit service improvements. These constraints, including legal issues, equipment requirements, and canyon development and funding, together dictate a limited, experimental role for public transit as part of a package of immediate transportation-related improvements. Specifically, constraints affecting transit service provision include the following:

- Legal constraints relating to existing franchises will need to be interpreted, perhaps by the courts, to determine what types of UTA service ".....,divert, lessen or compete for ....." the revenues of the existing private operator. The resolution of these institutional questions will result in three possible outcomes: (1) the existing private operator will continue to operate exclusively, perhaps with an expanded service schedule; (2) UTA and the private operator may serve different transit needs simultaneously, either by both operating non-competing services in the Canyons and/or by UTA providing feeder/collector service to specific pick-up points; or (3) UTA may operate exclusively, with proper and just compensation to the private operator for his losses.

- Equipment constraints limit the immediate deployment of a large fleet of "canyonized" and "winterized" buses with sufficient levels of comfort and ride quality to ensure enthusiastic response from riders. In addition, ancillary facilities for ski equipment will, of course, need to be part of the overall transit consideration. Properly equipping a large fleet for immediate service is a major constraint.

- Canyon development constraints will not be established on a definitive basis until results from the County "208" and land use planning studies are evaluated and the effects of development on environmental quality are understood. Large-scale improvements of any type - traffic management or transit service - are to be avoided until transportation planning can coordinate with future development planning.

- Funding constraints influence the fare structure which will accompany new transit service. Subsidy arrangements and/or transit use incentives, coordinated with the resort operators, could be integrated into the ultimate public transit concept. Again, such financial arrangements may well be dependent upon allowable levels of ski area development.

Recommendations for immediate transit improvements should be based on a notion of the long-term goals for the Cottonwood Canyon area. Although such policy guidelines have not been formally adopted by the County pending the findings of on-going research, it is clear nevertheless that future planning will, to some extent, favor the gradual de-emphasis of the use of private cars from Canyon access. This assumption is based on the following factors:

- There is presently limited capacity on Little Cottonwood Canyon road and even less capacity for parking, and it seems reasonable to assume that efforts to increase such capacity will be met unfavorably;
- Safety considerations, as a result of road conditions and avalanche threats, is a real problem to motorists;
- Environmental costs of exclusive reliance on private cars may be quite high;
- Significant concern exists with respect to energy consumption and increasing fuel costs;
- Any allowable future development is likely to be contingent upon greater reliance on mass movement schemes.

For these reasons, it is appropriate that the Immediate Action Program include a limited, but significant, improvement in transit. Although existing transit service to Little Cottonwood Canyon consists of a reasonable schedule serving the airport and downtown Salt Lake City, it is clear that service to the local Salt Lake community could be improved both in terms of schedule and cost in order to reduce the parking and roadway problems during peak periods. Since indications are that the private transit operator will provide approximately the same levels of service this year as in the past, the prospect for easing the parking demands and vehicle capacity problems is dependent upon supplemental transit service with significant use by those formerly driving private vehicles.

With daily commuting in Little Cottonwood Canyon involving some 700 employees, many of whom park in unsafe Canyon locations to carpool and hitchhike, provision of employee commuter service has substantial potential for reducing peak-hour congestion and parking requirements. Such service could constitute an effective first step in improving transit service for the Canyons.

In order to expedite the resolution of the public transit question in the Canyons, it is suggested that the Utah Transit Authority initiate this service. Until such time as permanent parking facilities near the Canyon mouth might be provided, a facility such as Brighton High School with a capacity of 550 cars could be used as a transfer point. According to UTA reports, sufficient equipment capable of Canyon runs would be available for this purpose on weekends.

Because the resort and lift operators have an interest in both reliable transportation for their employees and the provision of a maximum amount of customer parking, a subsidy arrangement with the operators or with the Town of Alta, as allowed in Section 11-20-34 of the UTA legislation, could be arranged to provide for nominal fares on the part of the employees. If so desired, the service from the Brighton High School parking lot could be expanded to include non-employees, providing that fare arrangements and equipment availability are adequate. However, it is cautioned that initial attempts to offer supplemental UTA service be modest in scale to serve as a test case for experimental purposes. A situation to be avoided in the introduction of new transit service is "over-promotion," unless it is certain that the operational capability is more than adequate to meet heavier-than-expected demands. Long waits and/or overcrowded buses upon introduction of service can discourage potential riders from future use, even if such adverse conditions are subsequently overcome.

This limited worker service can provide the first step in a long-range plan for provision of comprehensive transit service. It is clear, however, that such large-scale service will require the development of visitor parking, transfer and information facilities in the Valley adjacent to the Canyon entrances, and, in addition, the imposition of disincentives for auto use

including the possibility of outright restrictions on private vehicles in the Canyon. Until the level of development ultimately possible in the Canyon is determined, however, it is recommended that local transit services to supplement existing, visitor-oriented transit be provided by the Utah Transit Authority to gradually reduce exclusive dependence on private cars and to hasten the resolution of the future role of public transit in the Canyons. While long-range plans may call for sophisticated, capital-intensive systems, immediate programs including the initial worker service should rely on incremental improvements in bus transportation designed primarily to serve local needs and reduce auto dependency.