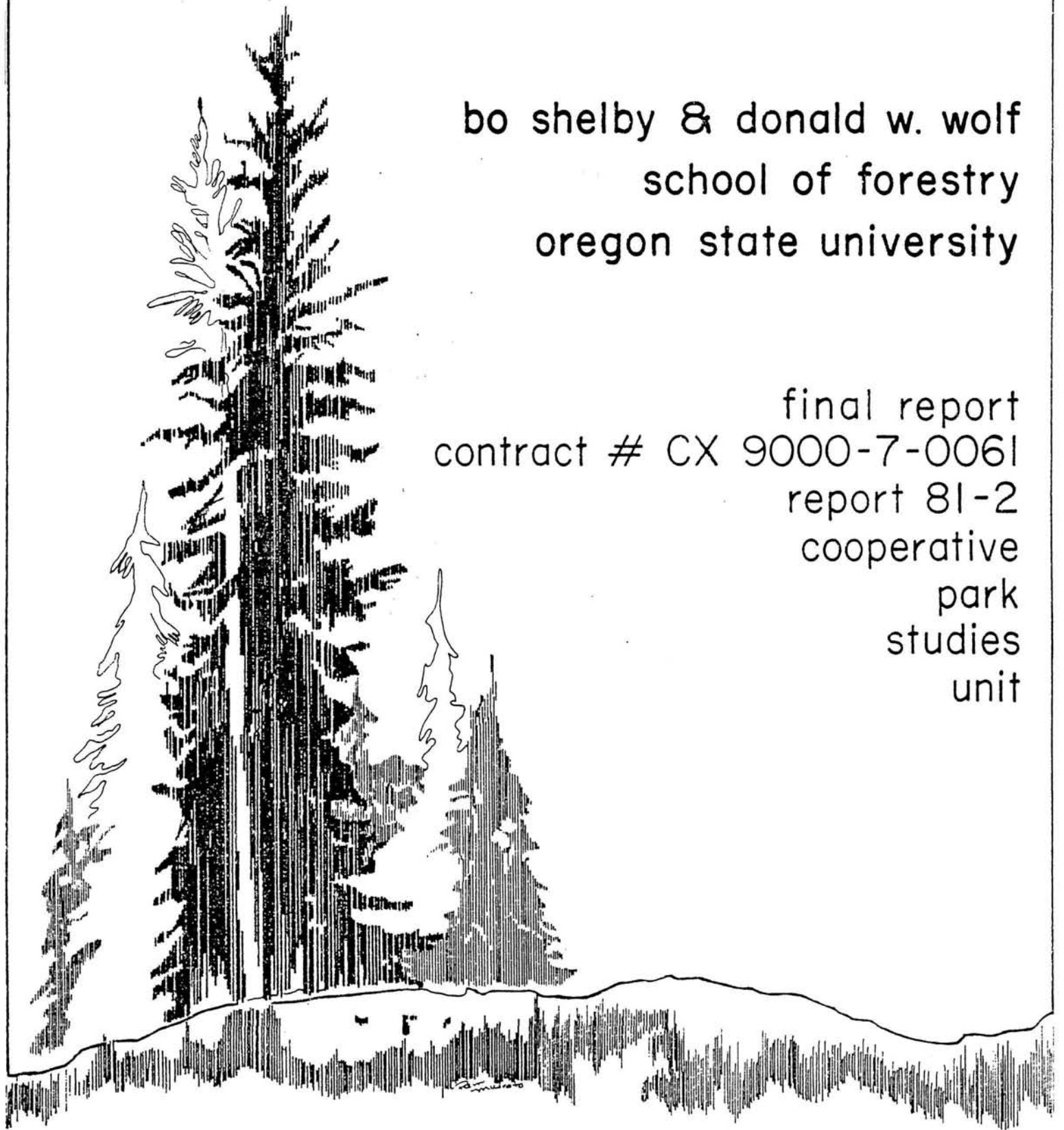


Social Impacts of Design Alternatives

Crater Lake National Park

bo shelby & donald w. wolf
school of forestry
oregon state university

final report
contract # CX 9000-7-0061
report 81-2
cooperative
park
studies
unit



FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

FINDING: Most development at Crater Lake has been close to the caldera rim. In this research we observed user behavior to see how design changes might affect use patterns and visitor experiences (pp. 1-2).

FINDING: Rim Village is a center of visitor activity. Observations indicate that most visitors park in the cafeteria lot and head for the cafeteria or rim area 1, visiting both before leaving. Most visitors never get to the other rim areas or the interpretive facilities (pp. 2-6).

FINDING: Experimental closure of the cafeteria lot changed the existing use pattern, more than doubling the use of rim area 2 and the interpretive facilities (pp. 6-10).

CONCLUSION: Findings suggest that the "development concept" outlined in the 1976 D.S.C. (Alternative 1) might not meet management objectives. Other alternatives are discussed (pp. 10-14).

RECOMMENDATION: Any redevelopment at Rim Village, including changes in the lodge, should be considered in light of overall use patterns and their effect on visitor experiences.

FINDING: Occupancy rates vary in the different parking lots, visitor activities, and use of barriers vary in the different rim areas, and shopping for curios is the predominant activity in the cafeteria building (pp. 15-18).

CONCLUSION: Visitors appear more likely to stop at pull-outs with large parking areas, parking separated from the road, a good view of the lake, obviously visible interpretive signs, and greater overall development. These act as "cues" which tell visitors that a site is "important" (pp. 19-25).

FINDING: Visitors are more likely to get out of their cars if there is a better view from outside and if an attraction such as an interpretive sign can be read only from outside (pp. 27-29).

CONCLUSION: Structures can be manipulated to encourage visitors to get out of their cars if this is a management goal (p. 30).

FINDING: Barriers are used in different ways, depending on their type and location relative to visitor attractions (pp. 30-39).

FINDING: Visitors are not evenly dispersed on roads around Rim Drive. Observations at road junctions suggest that use of road segments ranges from less than 10% to more than 60% of all park visitors (pp. 39-47, summarized on p. 48).

FINDING: Use of pull-outs also varies. "Most used" pull-outs are the Watchman and North Junction (pp. 47, 49).

CONCLUSION: Information regarding distribution of use can be used in designing interpretive efforts, allocating resources for construction and repair, and attempting to redistribute use (p. 47).

FINDING: Visitors ask different questions at different locations within the park (pp. 50-54).

CONCLUSION: A key to interpretation is giving people the right information at the right time. Information needs vary from one location to another, so information systems should be designed accordingly. In general, park personnel answer the same few questions over and over, so it may be desirable to anticipate the most common questions with "broadcast" approaches such as signs or interpretive talks.

FINDING: Most campers stay in Mazama Campground only one or two nights, and most do not make trips to Rim Village solely for the purpose of buying supplies.

CONCLUSION: The addition of shower and laundry facilities may increase the number of nights that parties stay in the campground, thereby reducing the percentage of visitors who have the opportunity to camp. A camper-services store will not greatly reduce congestion at Rim Village (pp. 57-58).

INTRODUCTION

Crater Lake National Park was developed in the early 1900's. At that time the prevailing philosophy of park development was to build roads directly to an area's major attraction and then place developments such as lodges, campgrounds, and other visitor facilities as close as possible. As a result Crater Lake has roads to the caldera from both the north and south entrances, and Rim Village, the center of visitor activity, is right on the rim. Similar development patterns can be seen in other parks developed around the same time; Yosemite and Yellowstone are examples.

This philosophy has changed with increasing park use and the environmental movement of the 1960's and 1970's. There is currently a greater concern for leaving the "natural wonders" more nearly in their natural state, keeping developments outside the park or at least away from major attractions. Mt. McKinley is an example, where vehicle traffic is restricted and development is limited.

This change in philosophy has created some problems for parks developed in earlier times. At Crater Lake there have been suggestions for redevelopment ranging from minor modification of existing facilities to complete removal of all buildings from the rim area. The latter alternative has been rejected, but there is still interest in some major changes in Rim Village and other areas around the lake.

Sociological research at Crater Lake was designed to anticipate the effects of various design changes. It is important to remember that developments have little value in and of themselves; their purpose is to enhance or facilitate visitor experiences. We usually think pretty carefully about how verbal messages such as signs, brochures, or programs affect people. But behavior is also shaped by the arrangement and appearance of physical features such as roads, parking areas, and walkways.

The general strategy of the sociological research was twofold. The first priority was to understand the effects of current design on visitor behavior. Given the existing facilities at Rim Village, for example, what do people do there and what kind of "Crater Lake Experience" do they have? With this "base line" established, the second concern was to try to predict how changes in development might alter visitor activities. If, for example, part of the parking space at Rim Village were moved to another area, how would use patterns and visitor experiences change?

The major data collection technique was direct observation of visitor behavior. There is a great deal of evidence showing that what people say they do is different from what they actually do. Systematic observation of behavior helps avoid this pitfall, and it is possible to make inferences about visitor experiences from detailed descriptions of activities.¹

Studies at Crater Lake occurred in a variety of locations. This report is organized into sections which address the following issues: 1) behavior patterns at Rim Village and changes produced by experimental closure of the cafeteria parking area; 2) characteristics of Rim Drive pull-outs, and their effects on behavior; 3) how people use or interact with walls and barriers; 4) visitor use patterns throughout the park; 5) visitor information needs at different locations; and 6) potential effects of changes in Mazama Campground.

RIM VILLAGE

We observed behavior at Rim Village during the summers of 1977 and 1978. Rim Village (Fig. 1) is the center of visitor activity in the park. Physical

¹The logic of the design-behavior-experience argument is presented in more detail in pages 3-8 of "Experimental Effects of Design on Behavior in a Natural Resource Setting" (Shelby and Wolf 1980).

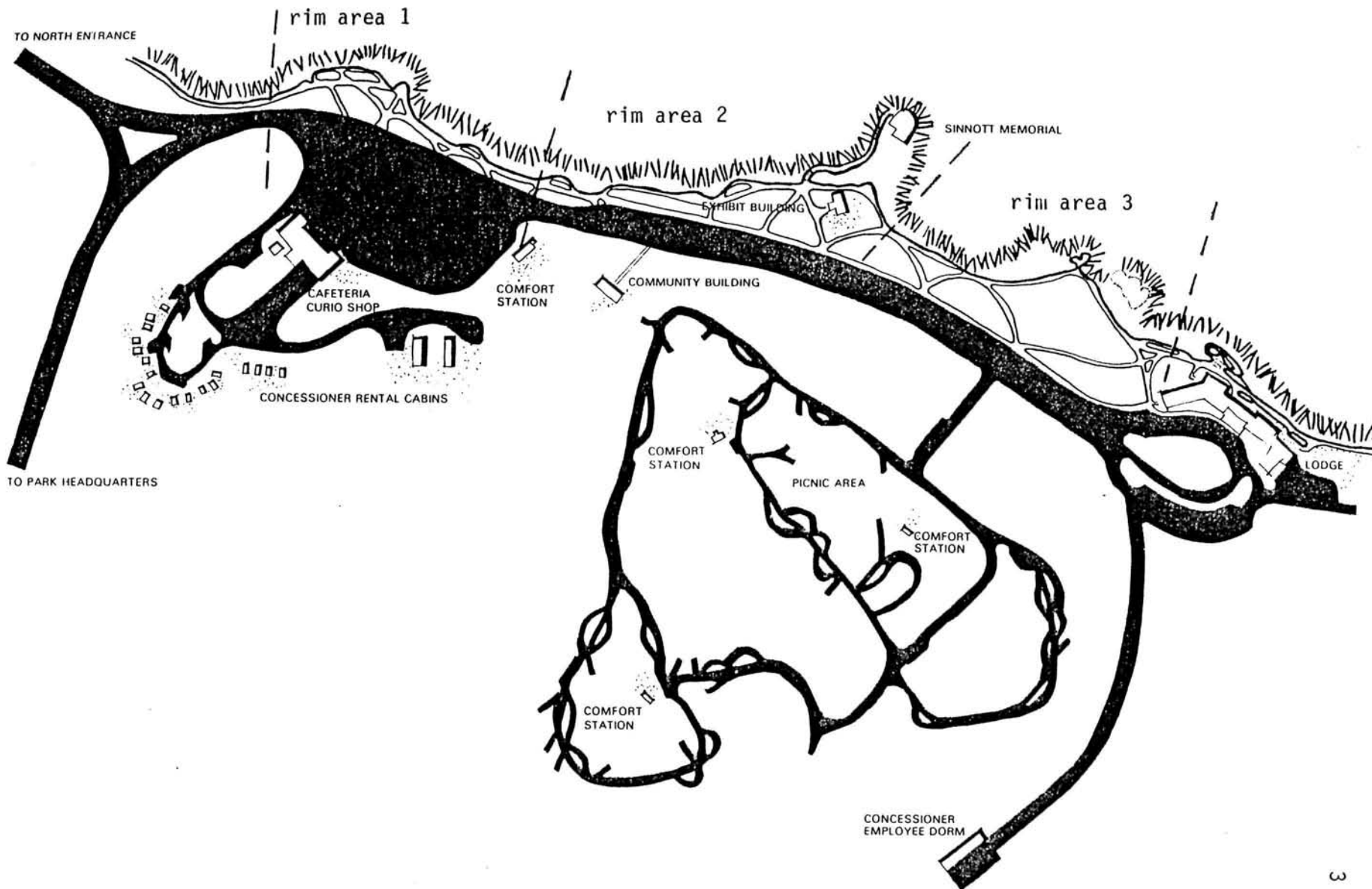


Figure 1. Layout and Facilities at Rim Village, Summer 1977.

structure was defined as the existing design of the area the most prominent features are three parking areas, three viewing areas along the caldera rim, and a large cafeteria building. The following description will be more clear if the reader refers to the map in Figure 1.

People enter Rim Village by car from the west. The first opportunity to stop is the rectangular parking area north of the cafeteria building, which resembles the lot of a large supermarket and has spaces for 159 cars. The road proceeds along the north edge of the cafeteria lot to the center parking area, which has head-in parking on both sides of the road. This long and narrow lot appears smaller than the cafeteria lot, although it has spaces for 178 cars. At the end of the center lot is the 67-car parking area for the lodge, which has overnight accommodations.

Rim Village offers approximately one-quarter mile of viewing area along the caldera rim. A low stone wall and paved walkway follow the rim, and cross cutting walks connect the rim to the parking lots. We divided the viewing area into three sections, based on geographic location and physical structure.

Adjacent to the cafeteria parking lot, rim area 1 is long, straight, quite narrow (approximately 200 yds. x 15-30 yds.), and sparsely vegetated. Standing at the stone wall along the rim, a visitor is essentially right next to the road and the cafeteria lot.

Rim area 2, adjacent to the west half of the center parking lot, is slightly longer and somewhat wider than area 1 (approximately 275 yds. x 30-75 yds.). The wall and walkway wind along the rim, providing more varied spaces with large grassy spots and more trees. This area also contains the Exhibit Building and the Sinott Memorial, which house the major interpretive facilities at Rim Village. On a lower plane, Sinott Memorial is visually separated from the main area.

Rim area 3 is similar to area 2 except that it contains no buildings.

The vegetation and walkways are varied, and a person standing at the rim is well removed from--although still in sight of--the road and parking lot.

The cafeteria building is a large stone and wood structure. It is a dominant feature upon entering the cafeteria lot, and it contains a curio shop, snack bar, small convenience grocery, cafeteria, and restaurant.

Data were first collected during a "base line" period in the summer of 1977. Analysis of these data and proposed redevelopment plans (both to be discussed later) suggested that it would be useful to know the effects of closing the cafeteria lot. This manipulation was accomplished in the summer of 1978, resulting in an "experimental" data collection period.

Data collection involved car counts in parking lots and observations of where people went and how they spent their time at Rim Village. Parking lot data were collected by simply walking through the lots and counting the number of cars in each one to determine the percent of spaces occupied. This was done 37 times during the study period, with times randomly distributed throughout the day. Counts were performed every hour during the experimental period (n=10).

Time distribution data were collected by randomly selecting cars as they entered Rim Village and then following the occupants as they visited rim areas 1, 2, 3, and/or the cafeteria.² Data included the order in which areas were

²During the base line period people were observed for their entire stay at Rim Village. Because this was too time-consuming and would have resulted in a small sample size for the shorter experimental period, we observed people only as they visited their first three areas; if by that time they had not left Rim Village, observation was terminated. To make them comparable, base line data were re-computed to reflect just the first three areas visited; this resulted in only minor changes.

visited and the time spent in each one. Each observation represented a group because individuals arriving together essentially stayed together. There were 49 groups observed during the base line period and 36 observed during the experimental closure.

FINDINGS OF THE EXPERIMENT

During the base line period, people were more likely to park in the cafeteria lot. On the average, 58% of the spaces were occupied between 8:00 a.m. and 7:00 p.m., while only 16% of the spaces in the center lot were filled (see Table 1). Use was concentrated in the cafeteria building and rim area 1 (see Table 2). Thirty-five percent of the visitors went to the cafeteria first, and 41% went first to rim area 1. About two-thirds visited both areas sometime during their stay. Only 22% went to rim area 2, and only 7% visited rim area 3.

Under normal circumstances, then, the average visitor to Rim Village arrives by car, parks in the cafeteria lot, and heads for the cafeteria or rim area 1, visiting both before leaving. The result is a north-south use pattern across the cafeteria lot. Most visitors never get to the other rim areas or the interpretive facilities (located in rim area 2).

When the cafeteria lot was closed during the experimental period, behavior changed dramatically. The obvious difference was that parking shifted from the cafeteria lot to the center lot, resulting in a 57% occupancy rate in the center area (see Table 1). There was no significant change in the use of the lodge lot.

The use of the cafeteria building was not significantly different, although the percentage of visitors who went there first and at some time decreased slightly (see Table 2). There were major changes in the use of rim areas 1 and 2. No one visited area 1 first and only 8% went there at all. The pro-

Table 1

AVERAGE OCCUPANCY OF RIM VILLAGE PARKING AREAS

Area	Base Line Period ^a	Experimental Period ^b
Cafeteria lot ^c	58%	2%
Center lot ^c	16%	57%
Lodge lot	49%	40%

^a n = 37

^b n = 10

^c changes are significant, $p < .001$

Table 2
DISTRIBUTION OF USE AT RIM VILLAGE

Area	Base Line Period ^a		Experimental Period ^b	
	% visiting this area first	% visiting this area sometime	% visiting this area first	% visiting this area sometime
Cafeteria building	35	65	22	58
Rim area 1 ^c	41	70	0	8
Rim area 2 ^c	4	22	42	64
Rim area 3 ^d	0	7	11	22

^a n = 49

^b n = 36

^c changes are significant, $p < .001$

^d changes are significant, $p < .10$

portion of visitors who went first to area 2 increased from 4% to 42%, and 64% went there at some time. The use of rim area 3 increased slightly, but the difference was not significant.

During the experimental period, then, the physical structure of Rim Village was changed by closing the cafeteria lot. People arrived and parked in the center lot, and they were most likely to visit rim area 2 first. The cafeteria was still a major attraction, but few used rim area 1 and the use of area 2 almost tripled, resulting in an east-west use pattern. The proportion of visitors using the interpretive facilities more than doubled (from 17% to 38%; $p < .02$).

IMPLICATIONS FOR MANAGEMENT

The concentration of use reflected in base line data suggested that some kind of structure was shaping user behavior. The experimental manipulation of physical structure produced a significant change, so this was a major determinant. It is important to note that other kinds of structure may also enter in. For example, the cafeteria building continued to attract visitors. This may be due in part to its prominent physical structure, but social structure (e.g., people look for a place to eat at mid-day) or the structure of past experience (e.g., people associate curio shopping with national parks) may also be important. Future studies could investigate the effects of these other kinds of structure.

It is reasonable to assume that the different behaviors during base line and experimental periods produced different visitor experiences. In the experiment, people visited a more spacious natural area with heavier vegetation. The walkways along the rim were longer and more varied, and users were further removed from the road and parking area. They were also more likely to visit the interpretive facilities. These certainly sound like

different "experiences," although this variable is difficult to measure directly.

The issue of physical structure is particularly important because the Park Service intends to redevelop Rim Village. The plan is to remove some parking from the immediate rim area, replacing it with a lot south of the cafeteria where the "concessioner rental cabins" are now located (see Figure 2). The center parking lot would be converted to a "greenspace" or pedestrian mall. Base line data indicate that this scenario would further concentrate use in the vicinity of the cafeteria and rim area 1, leaving the new pedestrian mall unused (as the center lot and rim areas 2 and 3 are now).

Some Design Alternatives for Rim Village

The following discussion is intended to help in re-thinking the development plans for Rim Village. It reflects the information we have been able to collect in our own work and talking with managers, but it isn't exhaustive. There may be other objectives or constraints that we haven't considered. The discussion is easier to follow with a Rim Village map (Figure 1, Figure 2, or both) in front of you.

Specifically, there appear to be three major objectives for re-development in this area:

- 1) Decrease the concentration of use and congestion in the cafeteria-cafeteria lot-rim area 1 complex.
- 2) Eliminate the need for visitors to cross a major vehicle thoroughfare when walking between the cafeteria building and the rim.
- 3) Encourage use of interpretive facilities, as parking in the center lot did during the experiment.

The two major constraints (aside from money, manpower, etc.) appear to be:

- 1) Minimize environmental change
- 2) Provide for snow removal and winter use

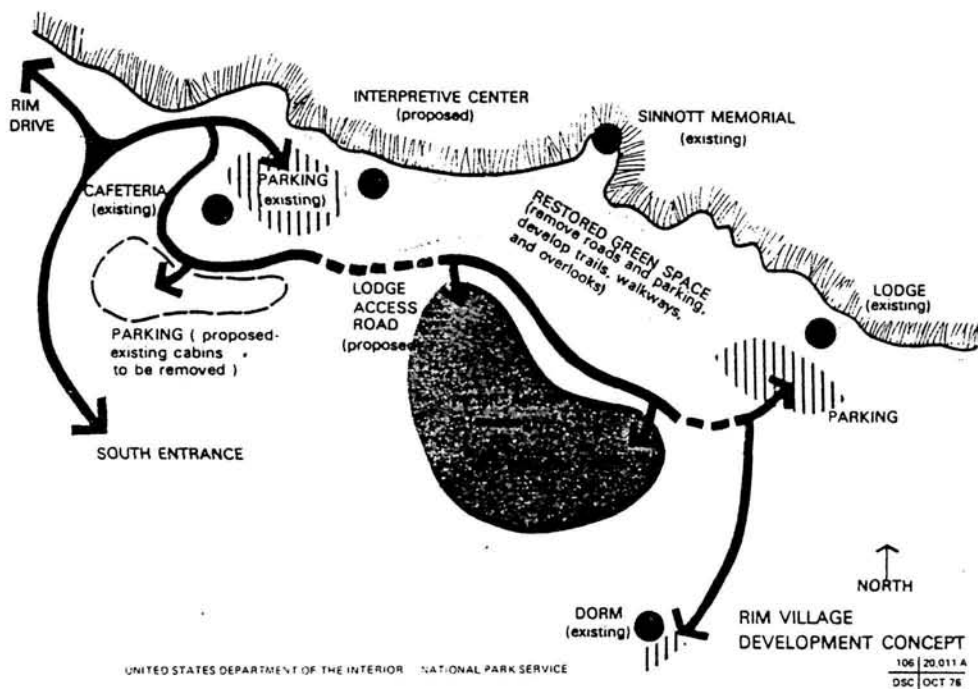


Figure 2. Proposed changes at Rim Village

There seem to be four major alternatives to accomplish these objectives.

1) Restore center lot to greenspace, add parking south of cafeteria building (cabins to be removed), and route lodge access road south of cafeteria. This is the "development concept" outlined in the October 1976 D.S.C. and shown in Figure 2.

2) Restore cafeteria lot to greenspace, add parking east of cafeteria and south of existing restroom building, route access road south of cafeteria.

3) Restore cafeteria lot to greenspace, add parking east of cafeteria and south of existing restroom building, route access from Munson Valley up past employee dorm. Traffic could exit by returning over the same route or via one-way road south of cafeteria.

4) Restore cafeteria lot to greenspace, add parking south of cafeteria building (cabins to be removed), route access south of cafeteria.

The alternatives are evaluated using objectives and constraints as evaluative criteria in Table 3. Alternative 1, restoring the center lot and shifting parking south of the cafeteria, would increase congestion around the cafeteria complex. Pedestrians would cross somewhat less traffic because some parking would occur south of the cafeteria, but the interpretive facility would be "off the beaten track," as it is now. Placing the proposed visitor center on the east end of rim area 2 would probably help but not completely solve this problem. This alternative would meet both constraints because there would be no new impacted areas and the cafeteria lot could be used in winter as it is now.

Alternative 2, restoring the cafeteria lot and shifting parking to the area east of the cafeteria, would decrease congestion by moving parked cars out of the pedestrian route which goes from the cafeteria to the rim. Pedestrians would not have to cross traffic, and the parking would be on the more east-west line from the cafeteria to rim area 2 and the interpretive facilities,

Table 3
Evaluating Alternatives for Rim Village Redevelopment

Alternatives	Objectives			Constraints	
	1 Decrease Congestion	2 Avoid Crossing Traffic	3 Encourage Interpretive Use	1 Minimize Environmental Change	2 Provide for Winter Use
1. restore center lot, parking S. of cafeteria	no	somewhat	no	yes	yes
2. restore cafeteria lot, parking E. of cafeteria, access S. of cafeteria	yes	yes	probably yes	probably yes	probably yes
3. restore cafeteria lot, parking E. of cafeteria, access past dorm	yes	yes	yes	no	probably yes
4. restore cafeteria lot,	somewhat	yes	maybe	yes	probably yes

encouraging use of those areas. The parking area east of the cafeteria would create some new impacts, but it appears that this area was already impacted when the old campground was built originally. The winter use issue is unclear; some people contend that access south of the lodge and use of this parking area would be a problem because snow drifts into this area. More definitive information about snow depths may be needed.

Alternative 3 is the same as alternative 2 except that a new access road would connect the highway up from park headquarters to the road past the concessioner dorm. Traffic could go both ways or one-way with the exit road running south of the cafeteria. This would decrease congestion more than other alternatives because traffic would flow one way and people would tend to park in the center lot, the first place they come to. Pedestrians wouldn't have to cross traffic and the interpretive building would be the first building seen from the center parking area, thus encouraging its use more than with other alternatives. The major drawback is the expense and environmental impact of the new road, although the distance separating the two existing roads is very small (walk part way up Mt. Garfield and take a look). The winter use issue needs exploration, but presumably the new road would be no harder to maintain than the current road, especially if it could handle two-way traffic during the winter.

Alternative 4, restoring the cafeteria lot and adding parking south of the cafeteria, would only partially decrease congestion in the cafeteria complex. People would park in the new lot (rather than the center lot) because it would be most prominent, but at least pedestrians would not have to cross traffic. Visitors would wind up in the cafeteria building first, but they would still walk out to the rim, and they might get to the new visitor center if it were close enough and easily visible. This design would not impact any new areas and would provide for winter use if snow removal south of the cafeteria is feasible (as per discussion of alternative 2).

OTHER FINDINGS AT RIM VILLAGE

Observations at Rim Village turned up several other findings. Average occupancy rates for the three parking areas during different times of the day are shown in Figure 3. The peak use times for the cafeteria and lodge lots reflected the activities there; the cafeteria lot filled up during the middle of the day, whereas the lodge lot was used at night. The center lot was generally used as an "overflow" lot; cars appeared in the west end during midday when the cafeteria lot filled and in the east end at night when the lodge was used.

Visitor activities in the three rim areas are shown in Table 4. Area 1 essentially was used for observing and photographing, whereas walking was the most common activity in areas 2 and 3. Almost all the visitors in area 1 spent some time observing the lake, compared to about half the people in other areas. Very little conversing or reading occurred in any area. Total time spent at rim areas 1, 2, and 3 averaged 10, 23, and 7 minutes, respectively.

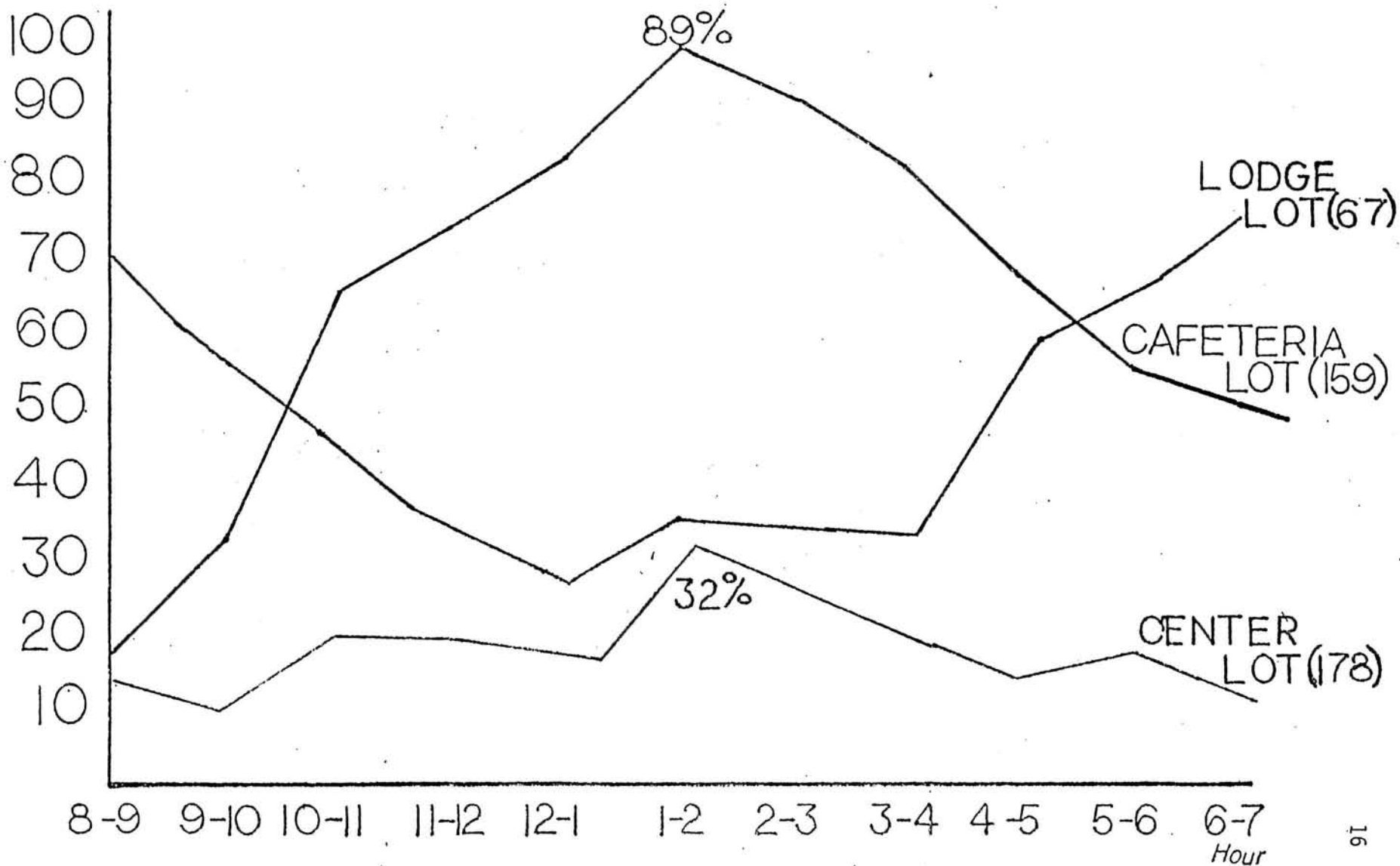
People used the stone barrier differently in the areas. A higher percentage stood at, stood or sat on, or crossed over the barrier in area 1. The narrower space in area 1, as well as the predominance of observing and picture-taking, probably account for people being at or on the barrier. People also crossed over the barrier in this area to feed the ground squirrels or see "better" (the wall in other areas was close enough to the edge that crossing over offered no advantage).

Within the cafeteria complex, shopping for curios was the predominant activity (see Table 5). Seventy-five percent of the people shopped, whereas 25 percent or less bought food, ate or drank, or used the restrooms. Time spent in the cafeteria averaged 23 minutes for all visitors.

Figure 3

RIM VILLAGE PARKING LOTS PERCENTAGE OCCUPANCY FROM 8AM TO 7PM

% Occupancy



n=37

Table 4
Visitor Uses of Rim Areas

Use	Percentage of visitors engaging in the specified activity			Significance (using χ^2 , d.f. = 2)
	Area 1	Area 2	Area 3	
ACTIVITIES				
Observing lake	89	51	47	.001
Taking photos	43	9	7	.001
Walking	17	70	87	.001
Conversing	1	13	2	.01
Reading	0	4	0	.20
INTERACTION WITH BARRIERS				
Standing at barrier	65	15	44	.001
Sitting or standing on barrier	24	6	4	.001
Over barrier	10	0	0	.01

Table 5

Visitor Activities Within Cafeteria Building

Activity	Percentage of visitors participating ^a	Average time (mins) for:	
		Participating visitors	All visitors
Shopping for curios	75	19	15
Buying food	25	7	2
Eating or drinking	24	18	4
Using restrooms	17	4	1

^a $p < 0.001$ based on χ^2 with d.f. = 3.

RIM DRIVE VIEWPOINTS

Scenic viewpoints on Rim Drive were chosen to further explore the effects of structure on visitor behavior. We were interested in what factors cause people to stop and, once they have stopped, what gets them out of their cars. The observer spent 15 minutes at each site on each day of observation, noting the number of cars going by and the number stopping. For those that stopped he recorded how long visitors spent at the site and the activities they engaged in. Sites were selected in order to contrast a variety of factors.

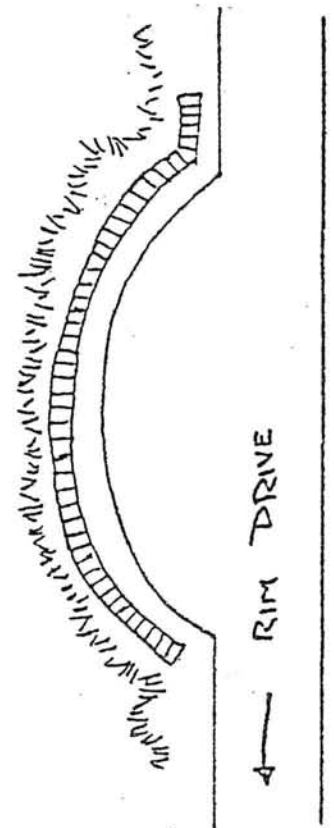
STOPPING POWER

"Stopping power" of pull-outs was operationally defined as the percent of cars going by that stopped. We identified five factors that may have an effect on stopping power: size of the parking area, separation from the road, the view from the parking area, visibility of interpretive signing, and degree of development. For each factor, two sites are compared which are, as nearly as possible, similar with respect to other stopping power factors. Ideally only one factor should vary in each comparison, but this was not always possible. Results here are suggestive rather than conclusive.

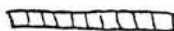
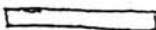
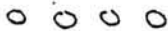


Size of the Parking Area

To the visitor the size of the parking area reflects more than just the availability of a place to park. A larger parking area is essentially a signal that a place is important and/or popular. Figure 4 compares the "Cleetwood Flow" and "Red Cloud Cliff and Pumice Castle" pull-outs, which have different sized parking areas but are similar in other respects. Results suggest that the size of the parking area has a significant effect on stopping power; 22% of the cars stop at the "Cleetwood Flow" pull out, while more than

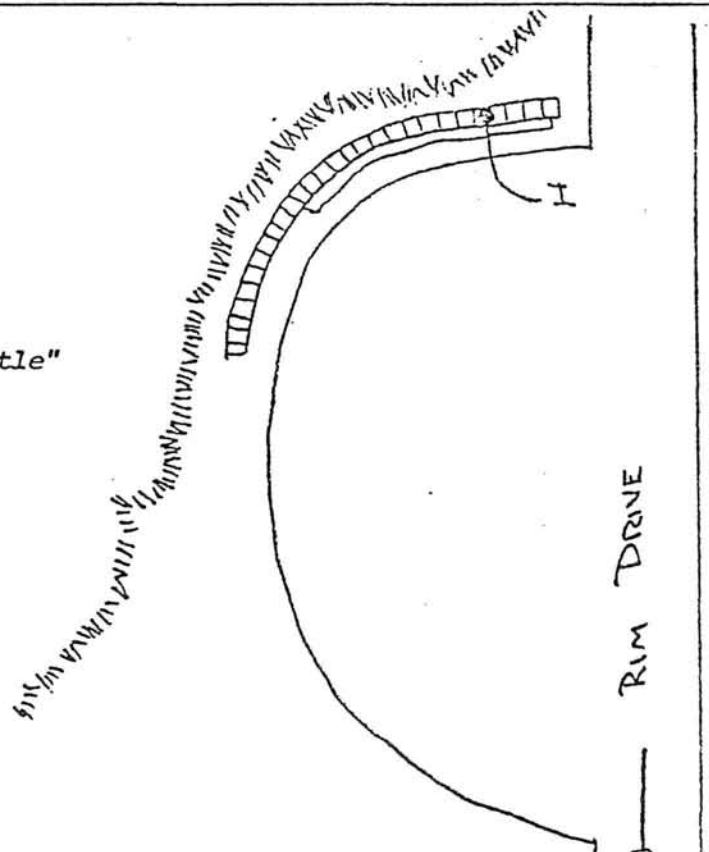
"Cleetwood Flow" pull out, 10.9 miles from Rim Village (a); where 22% of the cars going by stopped.*



LEGEND

-  Stone wall barriers
-  Sidewalks
-  Semi-permeable barriers
-  Interpretive signs
-  The Rim edge

"Red Cloud Cliff and Pumice Castle" pull out, 18.7 miles from Rim Village; where 48% of the cars going by stopped.*



(a) All distances are measured clockwise from Rim Village.

* $p < .001$

twice as many (58%) stop at the larger "Red Cloud Cliff and Pumice Castle" area ($p < .001$).

Parking Separated from the Road

When the parking at a viewpoint is separated from the road by a green space this may give the visitor the impression that the area is large and that the viewpoint is important because more work has been put into its construction. Figure 5 shows "Skell Head" pull out with its parking separated from the road, and "Red Cloud Cliff and Pumice Castle" pull out where the parking is immediately adjacent to the road. The two sites are similar in all other relevant factors, but more cars (61%) stop at "Skell Head" than at "Red Cloud Cliff and Pumice Castle" (48%). This difference is not significant at traditional levels ($p < .2$).

View from Parking

Because Crater Lake is the reason people visit the park, a view of the Lake is an important factor in getting visitors to stop. The "Cleetwood Flow" and "What Is Soil?" pull outs (Fig. 6) are similar except for the view available from the parking area. At the "Cleetwood Flow" pull out 22% of the cars stop, while at "What Is Soil?" less than half as many (10%) stop ($p < .02$).


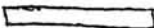



Interpretive Signing Visible from the Road

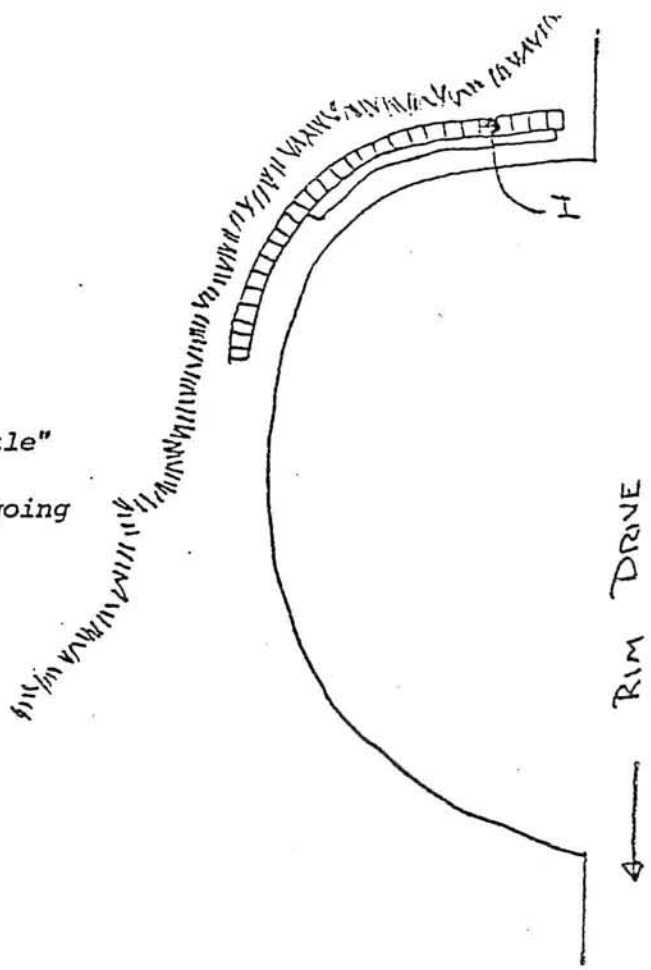
Interpretive signs offer visitors an opportunity to increase their understanding and knowledge of Crater Lake, and these signs may contribute to the number of visitors stopping at a pull out. Figure 7 shows two pull outs that are similar except for interpretive signing. The "Skell Head" pull out, which has a sign visible from the road, stops 61% of the cars that go by. At the pull out without interpretive signing .4 miles past the "Red Cloud Cliff and

PARKING SEPARATED FROM THE ROAD

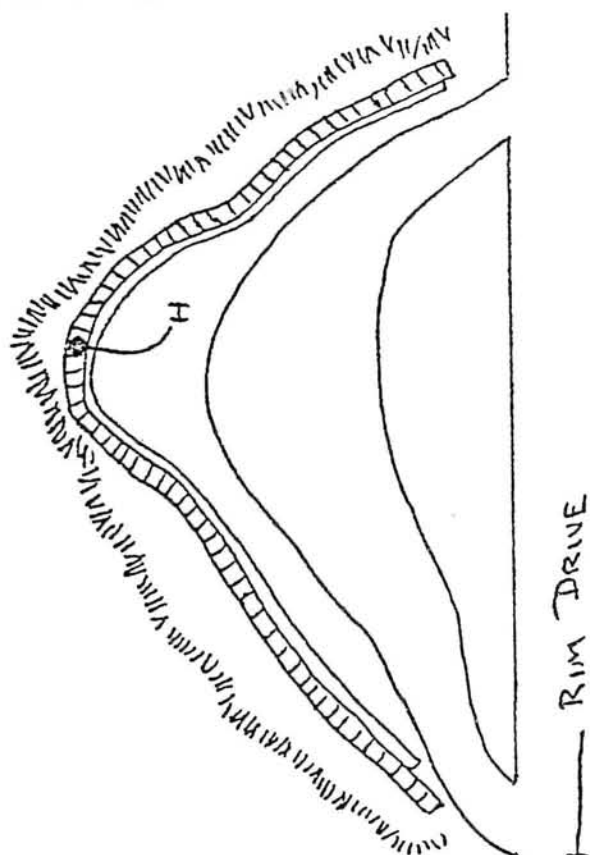
"Red Cloud Cliff and Pumice Castle"
pull out, 18.7 miles from Rim
Village; where 48% of the cars going
by stopped.*

LEGEND

-  Stone wall barriers
-  Sidewalks
-  Semi-permeable barriers
-  Interpretive signs
-  The Rim edge



"Skell Head" pull out, 14.8 miles
from Rim Village; where 61% of
the cars going by stopped.*


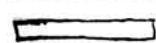
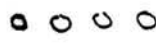

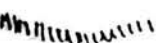


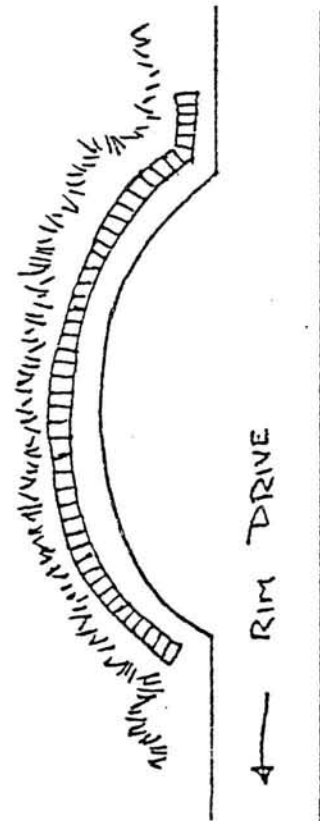
*p < .2

VIEW FROM PARKING

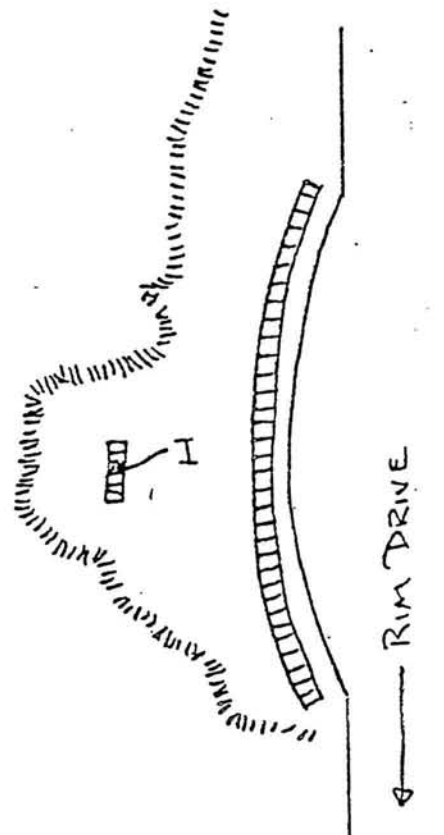
"Cleetwood Flow" pull out, 10.9 miles from Rim Village; where 22% of the cars going by stopped.*

LEGEND

-  Stone wall barriers
-  Sidewalks
-  Semi-permeable barriers
-  Interpretive signs
-  The Rim edge



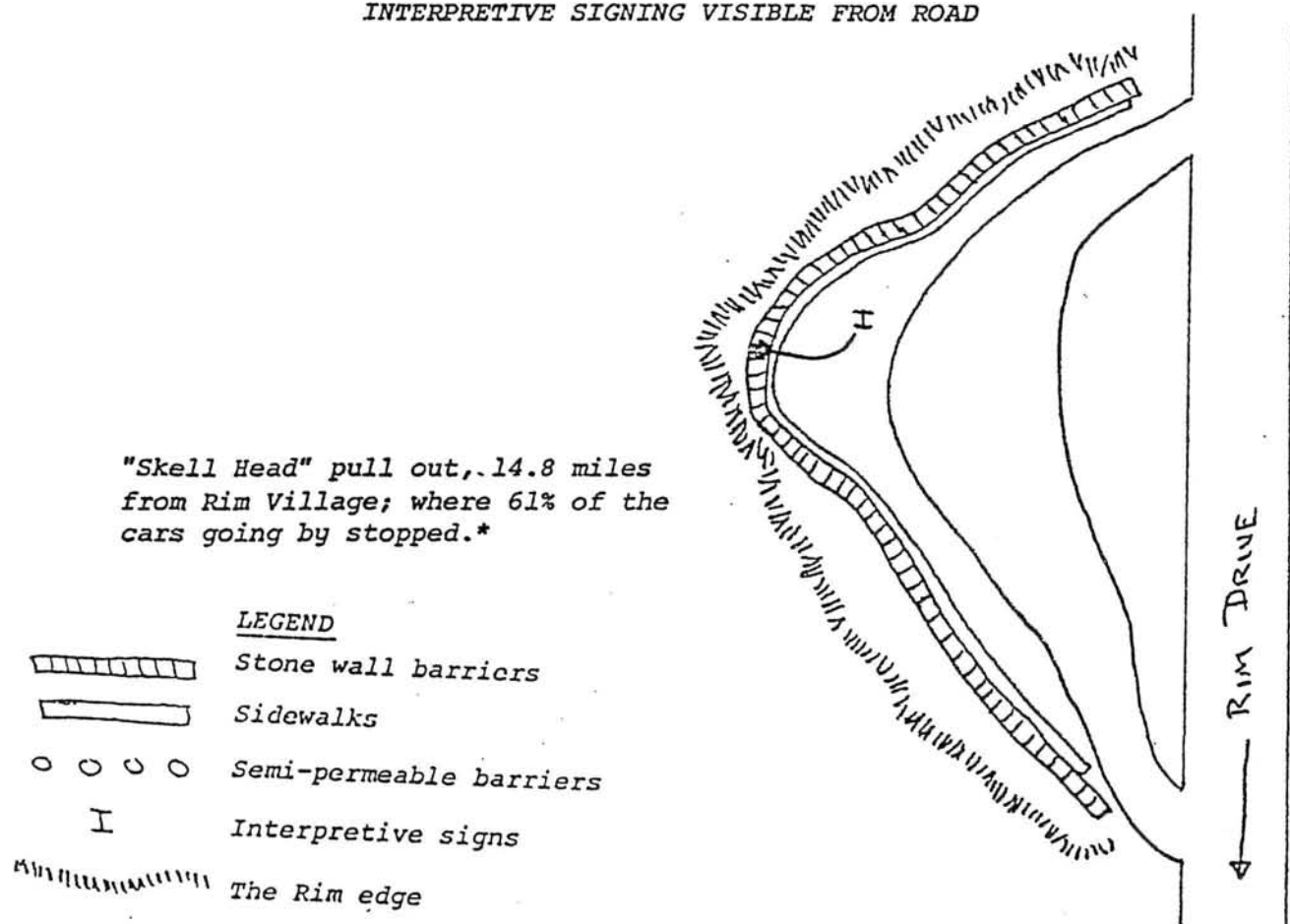
"What Is Soil?" pull out, 12.5 miles from Rim Village; where 10% of the cars going by stopped.*



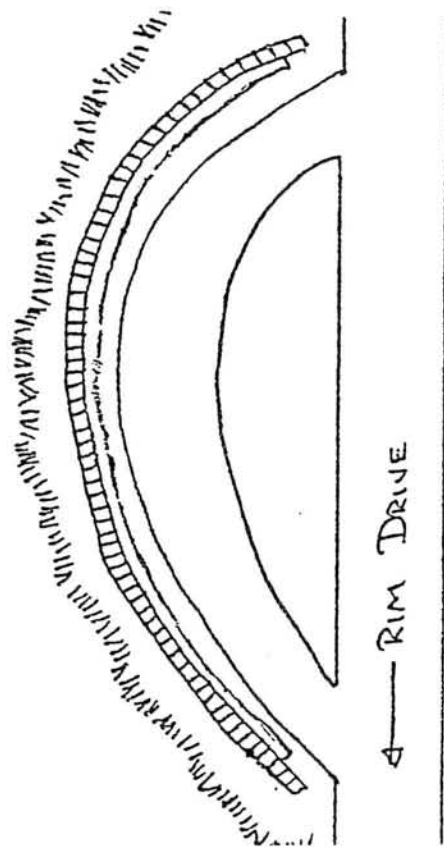
*p<.02

Figure 7

INTERPRETIVE SIGNING VISIBLE FROM ROAD



Unnamed pull out .4 miles past "Red Cloud Cliff and Pumice Castle" pull out, 19.1 miles from Rim Village; where 43% of the cars going by stopped.*

* $p < .05$

Pumice Castle" pull out, only 43% of the cars stop ($p < .05$).

Degree of Development





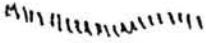
The overall level of development combines the four preceding factors. It differentiates a site that has had much work put into it from a relatively undeveloped site. The "Skell Head" pull out is separated from the road, has low stone walls, sidewalks, a large parking area (15 to 20 cars), interpretive signing, and an excellent view of the Lake (see Figure 8). This site contrasts in every respect except quality of view with the undeveloped area adjoining the northwest end of the "What Is Soil?" pull out. The latter site has no solid barrier but instead wooden reflector posts for traffic safety, no paving, no sidewalks, a medium-sized parking area (10 to 15 cars), and no interpretive signing. Like the Skell Head site, this pull out offers a spectacular view of the Lake. At the more developed "Skell Head" pull out 61% of the cars stop, while less than half as many (30%) stop at the undeveloped, unnamed site ($p < .05$).

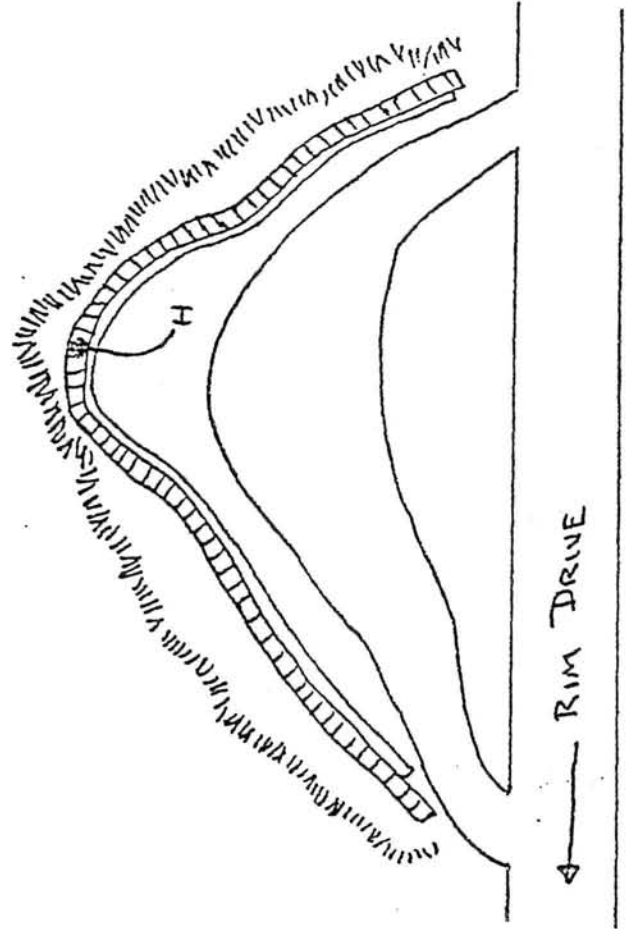
Implications for Management

The developments discussed in the preceding sections are essentially "cues" which tell visitors that the site is important to managers of the area. At sites that a manager particularly wants visitors to see, structures can be manipulated to increase the probability that visitors will stop. A large parking area, separation from the road, a good view of the lake, and obviously placed interpretive signs are all factors which attract visitors. The overall level of development also indicates that a site is relatively important. Conversely, visitors can be directed away from sites that are fragile or dangerous by "cues" which indicate that the site is unimportant.

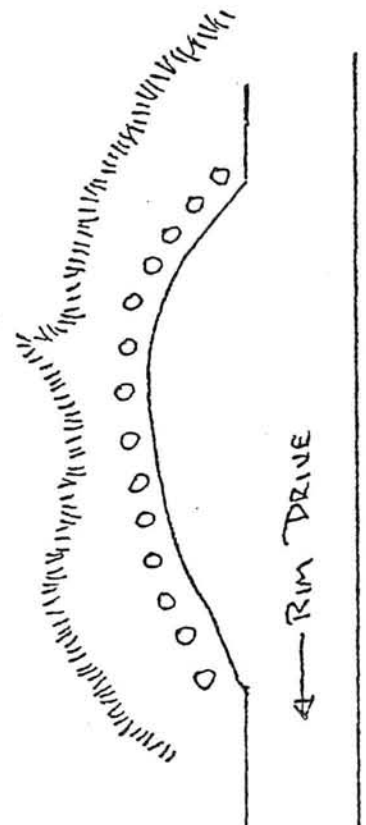
DEGREE OF DEVELOPMENT

"Skell Head" pull out, 14.8 miles from Rim Village; where 61% of the cars going by stopped.*

- LEGEND
-  Stone wall barriers
 -  Sidewalks
 -  Semi-permeable barriers
 -  Interpretive signs
 -  The Rim edge



Unnamed pull out adjoining the NW end of the "What Is Soil?" pull out, 12.5 miles from Rim Village; where 30% of the cars going by stopped.*



*p < .05

GETTING THE VISITOR OUT OF THE CAR

We identified two factors that may have an effect on how many visitors got out of their cars once they had stopped. These factors are a better view from outside of the car and an attraction such as an interpretive sign that can only be read from outside the car. At each site we recorded the percentage of groups in which at least one person got out of the car.

Better View From Outside

Once visitors have stopped at a pull out, the possibility of a better view from outside the car may entice them out. Figure 9 shows two sites that are similar except for the view available from outside the car. The "Cleetwood Flow" pull out offers a good view of the interpretive sign and the Lake from inside the car, but by stepping out a more spectacular view is available. At this site someone got out of the car 69% of the time.

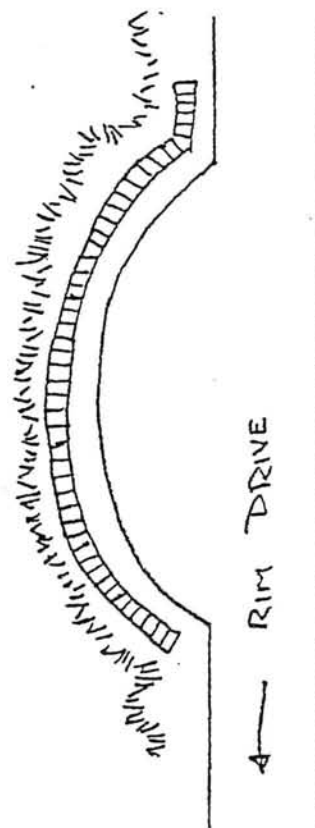
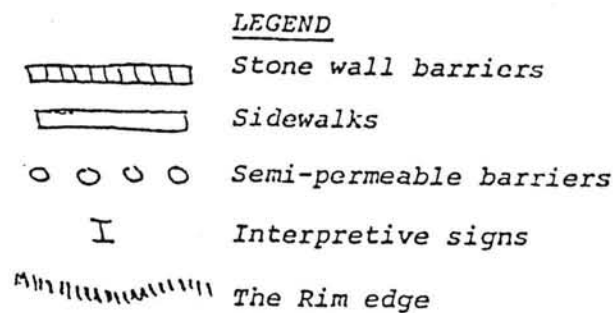
At the "Red Cloud Cliff and Pumice Castle" pull out, the rock formations and the interpretive sign can be seen from inside the car. In addition, the caldera walls slope so that even getting out there is no point where the visitor can find the spectacular view offered at the "Cleetwood Flow" pull out. Consequently only 53% of the visitors leave the car at this site ($p < .02$).

Attraction Must Be Viewed Outside the Car

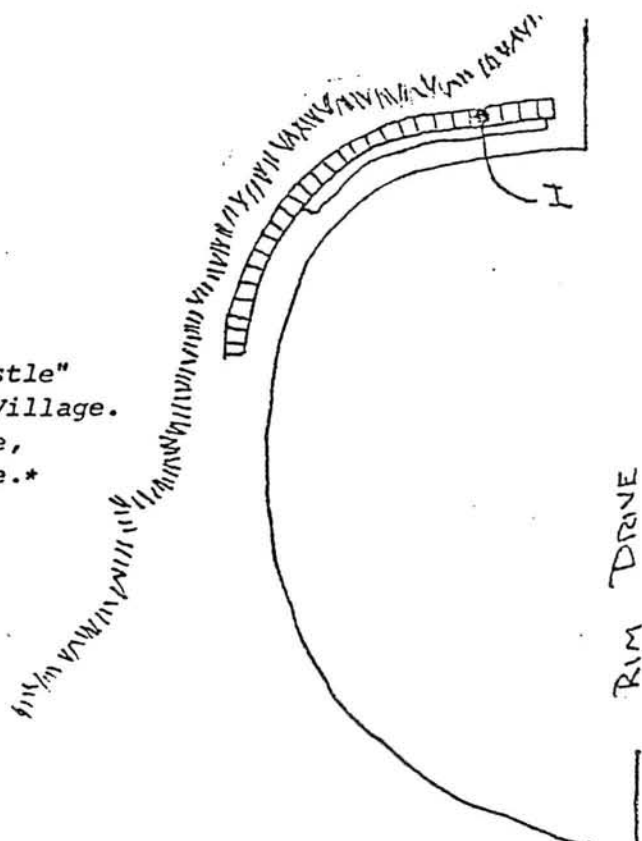
An attraction such as an interpretive sign may also serve to draw visitors out of their cars. Figure 10 shows the "Skell Head" and "Red Cloud Cliff and Pumice Castle" pull outs. Both sites have interpretive signs and a view visible from the car, but at "Skell Head" the visitor must leave the car to be able to read the sign. Of the groups who stopped at Skell Head 82% had someone leave the car, while at "Red Cloud Cliff and Pumice Castle" someone got out only 53% of the time ($p < .02$).

BETTER VIEW FROM OUTSIDE

"Cleetwood Flow" pull out, 10.9 miles from Rim Village. Of the groups that stopped here, someone got out 69% of the time.*



"Red Cloud Cliff and Pumice Castle" pull out, 18.7 miles from Rim Village. Of the groups that stopped here, someone got out 53% of the time.*


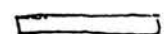
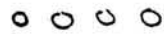
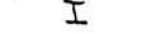
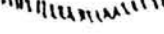


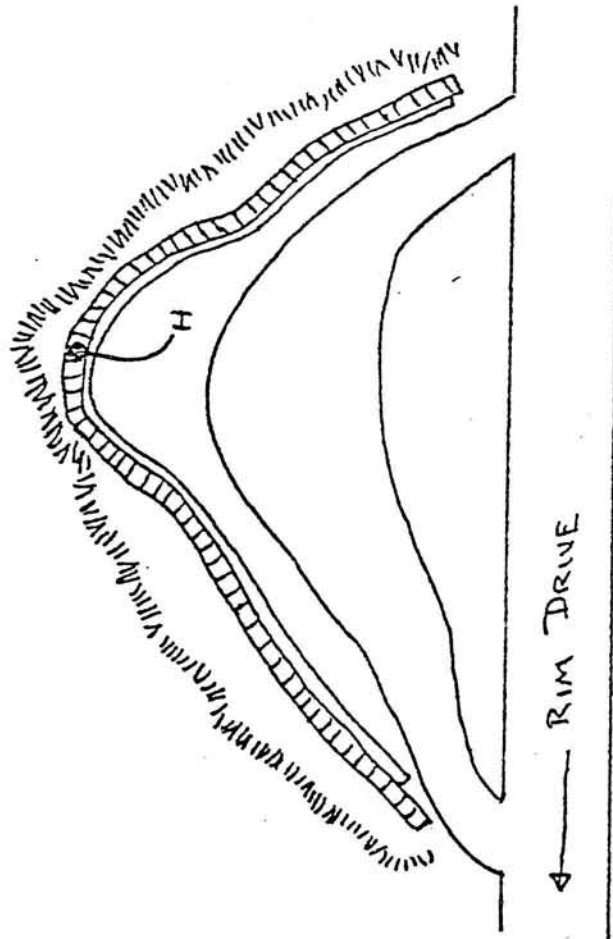
* $p < .02$

ATTRACTION MUST BE VIEWED OUT OF CAR

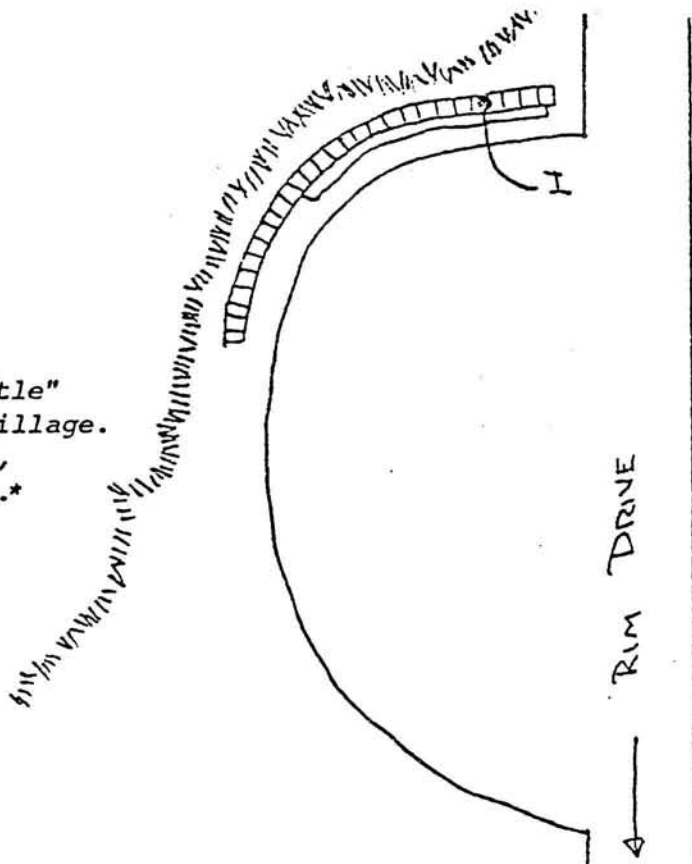
"Skell Head" pull out, 14.8 miles from Rim Village. Of the groups that stopped here, someone got out 82% of the time.*

LEGEND

-  Stone wall barriers
-  Sidewalks
-  Semi-permeable barriers
-  Interpretive signs
-  The Rim edge



"Red Cloud Cliff and Pumice Castle" pull out, 18.7 miles from Rim Village. Of the groups that stopped here, someone got out 53% of the time.*



*p<.02

Implications for Management

For many visitors the "National Park Experience" occurs from behind the windshield of a car. Getting visitors out of their cars and into closer contact with the resource may be a management goal. If so, data presented here suggest that this can be accomplished by manipulating structures. By providing attractions such as a better view or an interpretive sign that cannot be seen from inside, the manager has a better chance of enticing visitors away from their cars.

WALLS AND BARRIERS

Barriers represent another set of structures which affect visitor behavior. It appears that different kinds and placements of barriers give visitors different "messages" about what they are supposed to do. At the viewpoints along Rim Drive we kept track of the amount of time people spent at the barrier, on the barrier, or over the barrier. By analyzing the characteristics of the different sites we discovered four factors which affect how the barriers are used. These include the type of barrier, the amount of separation between the car and the barrier, the relationship of attractions (such as interpretive signs) to the barrier, and the relationship of the best view to the barrier.

TYPE OF BARRIER

Along Rim Drive there are basically two types of barriers: low solid stone walls and semi-permeable barriers comprised of either large boulders or wooden reflector posts. The former are used to block both cars and people from areas that are potentially dangerous, while the latter are meant to restrict only cars.

Differences in the barriers give the visitor different cues. A solid barrier is a greater obstacle and fewer visitors appear willing to cross over. This is the type of barrier found at the "Red Cloud Cliff and Pumice Castle"

pull out (Fig. 11), where only 11% of the visitors who got out of their cars crossed over the barrier. In contrast, the semi-permeable type of barrier found at the unnamed area adjoining the Northwest end of the "What Is Soil?" pull out is not viewed as a serious obstacle. Here 70% of those who got out of their cars crossed over the barrier ($p < .001$).

SEPARATION OF CAR AND BARRIER

When the barrier is right next to the parking area visitors may view it as an extension of the car and use it as a place to sit and view the lake. This is the case at the "Cleetwood Flow" pull out (Fig. 12) where 28% of the visitors who get out of their cars spend time on the barrier. This is a significantly ($p < .001$) larger percentage than at the "Skell Head" pull out where the barrier is farther away. In this area cars are separated from the barrier by a wide sidewalk and only 1% of the visitors who get out spend any time on the barrier.

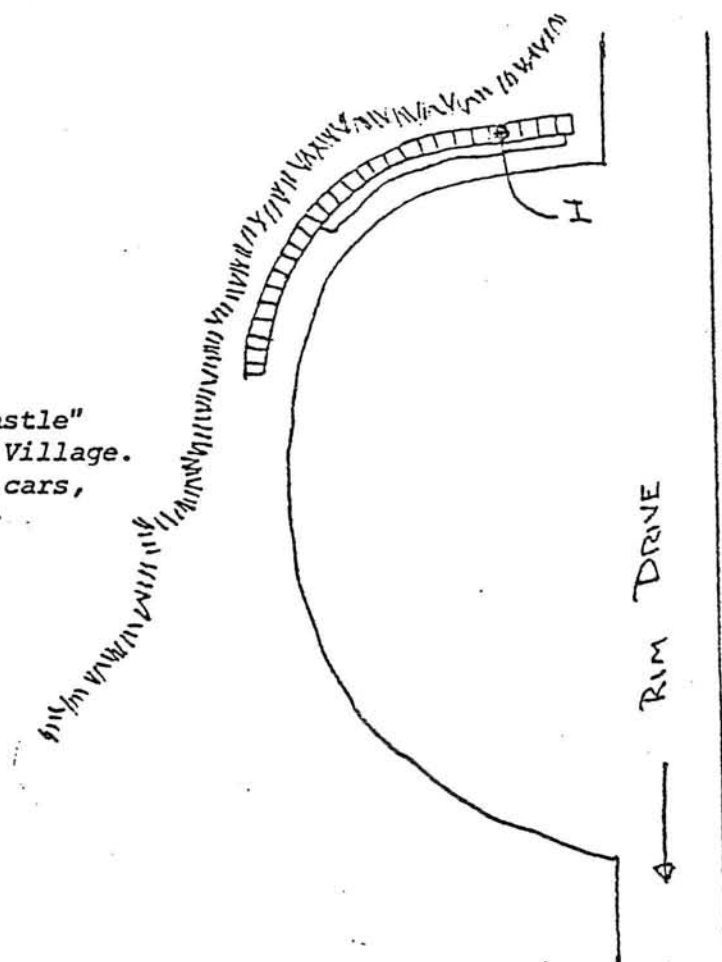
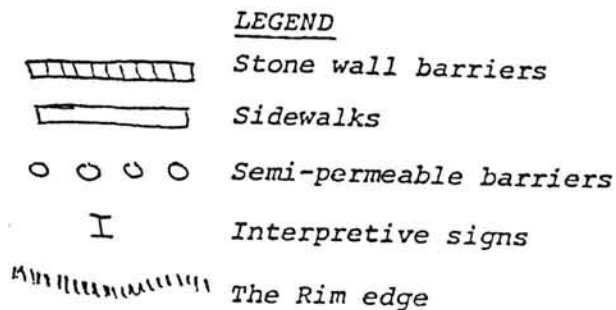
ATTRACTION AND THE BARRIER

A barrier gives the visitor cues about what to do and what not to do, but sometimes other cues are stronger than those provided by the barrier. At the "What Is Soil?" pull out (Fig. 13), the interpretive sign is well beyond the stone wall and visitors must cross the barrier to read it. Of those getting out at this site, 92% crossed over the barrier. These conflicting cues contrast with the situation at the "Skell Head" pull out, where the sign is on the barrier. Here the locations of both the sign and the barrier suggest that the visitor need go no further. Only 1% of the visitors getting out of their cars cross over the barrier here ($p < .001$).

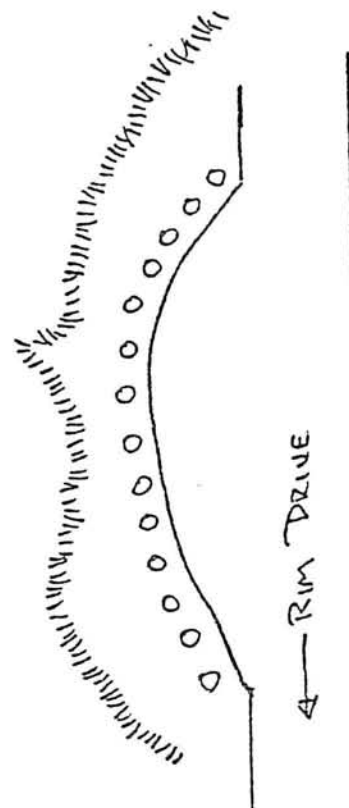
Figure 11

TYPES OF BARRIERS

"Red Cloud Cliff and Pumice Castle"
pull out, 18.7 miles from Rim Village.
Of those who got out of their cars,
11% crossed over the barrier.*



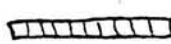
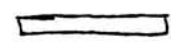
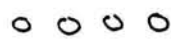


Unnamed pull out adjoining the
NW end of the "What Is Soil?"
pull out, 12.5 miles from Rim
Village. Of those who got out
of their cars, 70% crossed over
the barrier.*

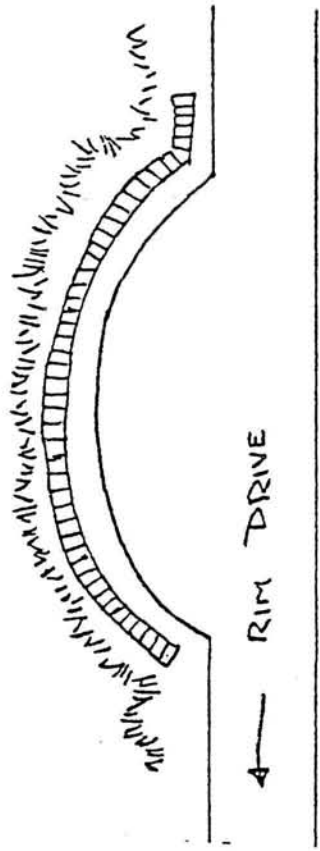
* $p < .001$

SEPARATION OF CAR AND BARRIER

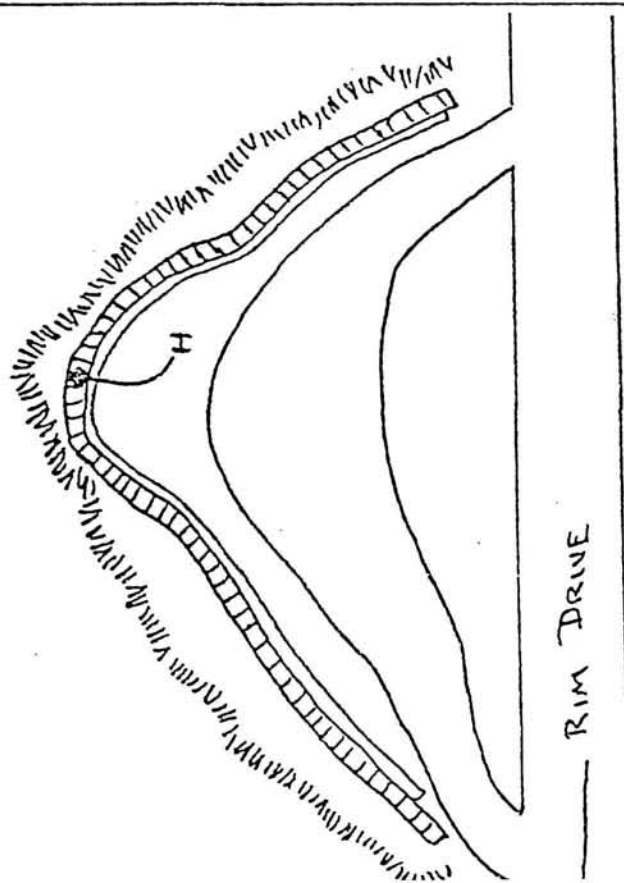
"Cleetwood Flow" pull out, 10.9 miles from Rim Village. Of those who got out of their cars, 28% spent time on the barrier.*

LEGEND

-  Stone wall barriers
-  Sidewalks
-  Semi-permeable barriers
-  Interpretive signs
-  The Rim edge



"Skell Head" pull out, 14.8 miles from Rim Village. Of those who got out of their cars, 1% spent time on the barrier.*







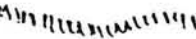
*p<.001

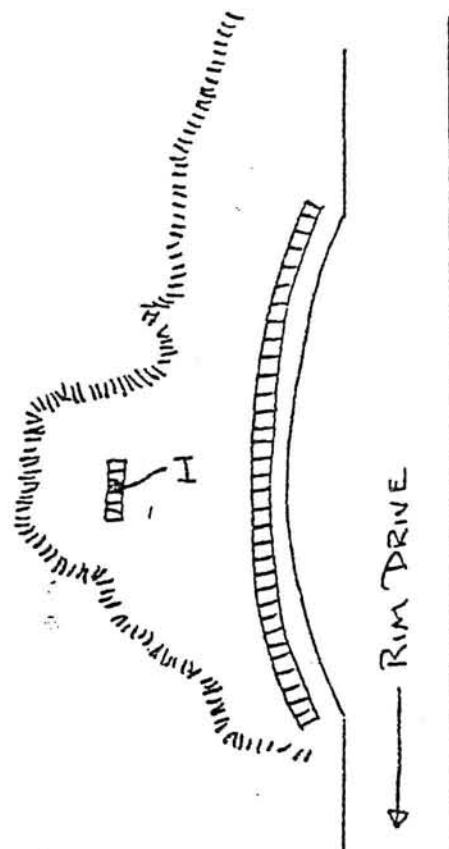
Figure 13

RELATION BETWEEN THE ATTRACTION AND THE BARRIER

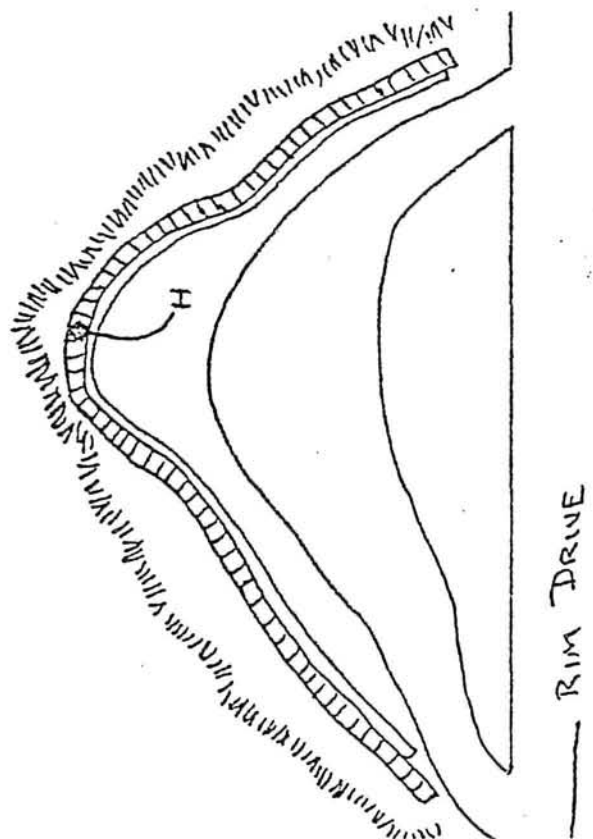
"What Is Soil?" pull out, 12.5 miles from Rim Village. Of those who got out of their cars, 92% crossed over the barrier.*

LEGEND

-  Stone wall barriers
-  Sidewalks
-  Semi-permeable barriers
-  Interpretive signs
-  The Rim edge



"Skell Head" pull out, 14.8 miles from Rim Village. Of those who got out of their cars 1% crossed over the barrier.



*p<.001

RELATIONSHIP OF THE VIEW AND THE BARRIER

Just as man-made attractions such as interpretive signs may influence visitor use of barriers, natural attractions such as the view may also have an effect. On the two-way portion of Rim Drive between Rim Village and North Junction are two sites which illustrate the relationship of a barrier and a view. An unnamed pull out 1.6 miles from Rim Village (Fig. 14) has an excellent view of the lake which is available if the visitor crosses the semi-permeable barrier and walks to the rim. All (100%) of the visitors who get out of their cars cross the barrier and view the lake from this point. This contrasts with the "Wizard Island" pull out 2.2 miles from Rim Village; few people (3%) cross the barrier here because an excellent view is available from the barrier ($p < .001$).



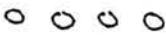


Further illustration of the relationship between the barrier and the view can be shown by comparing three sites on the one-way portion of Rim Drive. (see Fig. 15). At the unnamed pull out .4 miles past "Red Cloud Cliff and Pumice Castle" the view from standing at the barrier is obstructed by trees. The best view is from on top of the barrier, and as a result, 17% of the visitors who get out stand on the barrier. Standing on the wall gives added height, and most visitors then walk along the top of it until finding a space to view the lake between the trees.

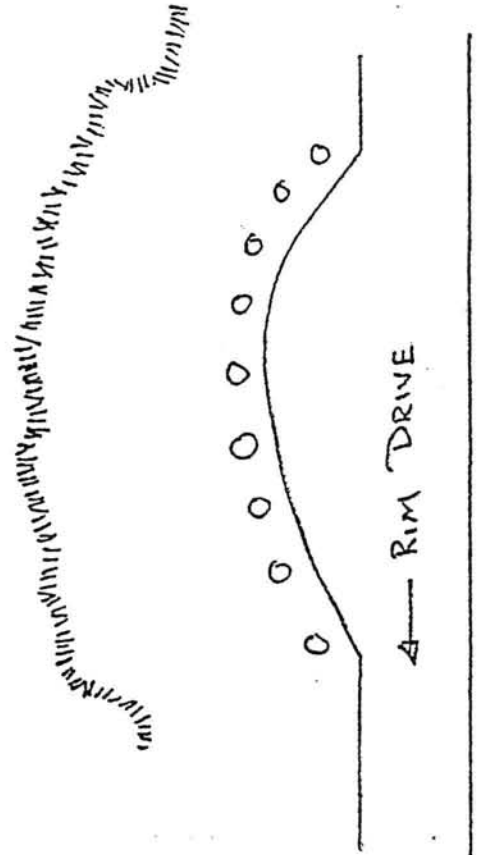
At the "Grotto Cove" pull out the area between the parking lot and the caldera wall is a gentle slope. This slope obstructs the view of the lake, and consequently 40% of the visitors cross over the barrier to obtain a better view. In contrast, the barrier at the "Skell Head" pull out is placed near the edge of the caldera precipice and provides an excellent view of the lake by standing at the barrier. Most (95%) of the visitors who get out of their cars at this site stay at the barrier.

RELATION BETWEEN THE VIEW AND THE BARRIER

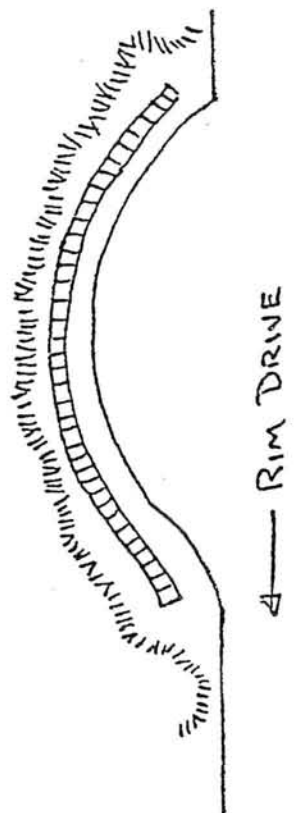
Unnamed pull out 1.6 miles from Rim Village. Of those who got out of their cars, 100% crossed over the barrier.*

LEGEND

-  Stone wall barriers
-  Sidewalks
-  Semi-permeable barriers
-  Interpretive signs
-  The Rim edge



"Wizard Island" pull out, 2.2 miles from Rim Village. Of those who got out of their cars, 3% crossed over the barrier.*








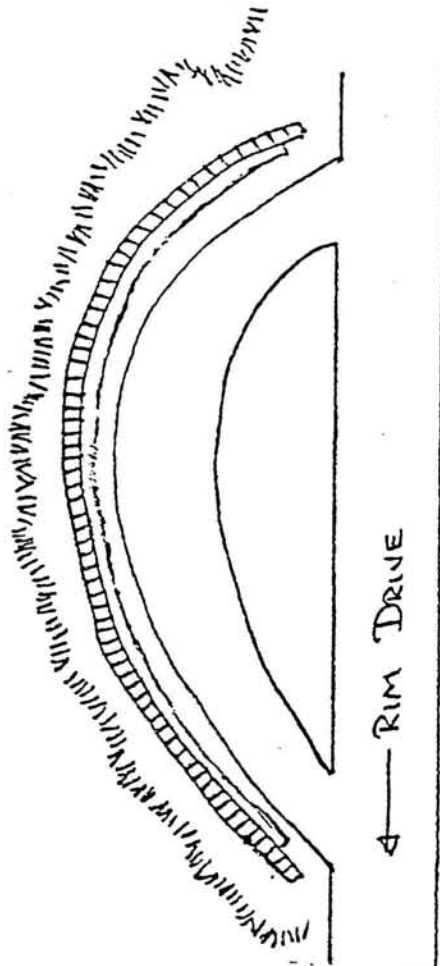
*p<.001

RELATION BETWEEN THE VIEW AND THE BARRIER

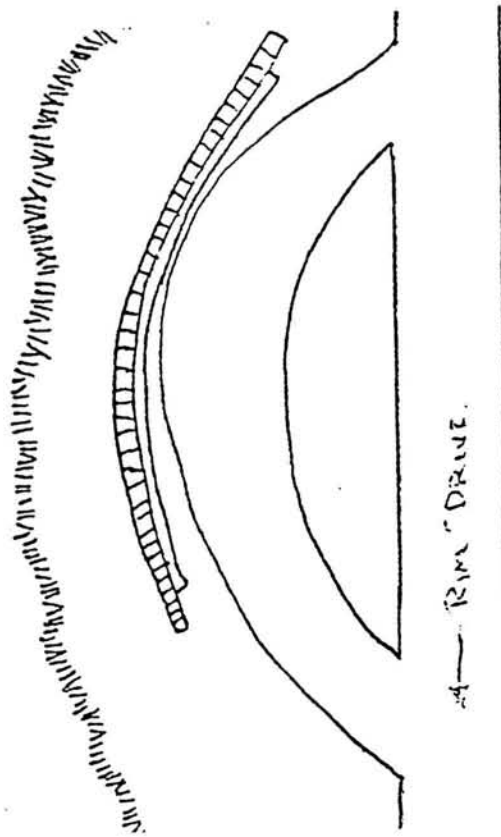
Unnamed pull out .4 miles past "Red Cloud Cliff and Pumice Castle" pull out, 19.1 miles from Rim Village. Of those who got out, 17% spent time on the barrier.

LEGEND

-  Stone wall barriers
-  Sidewalks
-  Semi-permeable barriers
-  Interpretive signs
-  The Rim edge








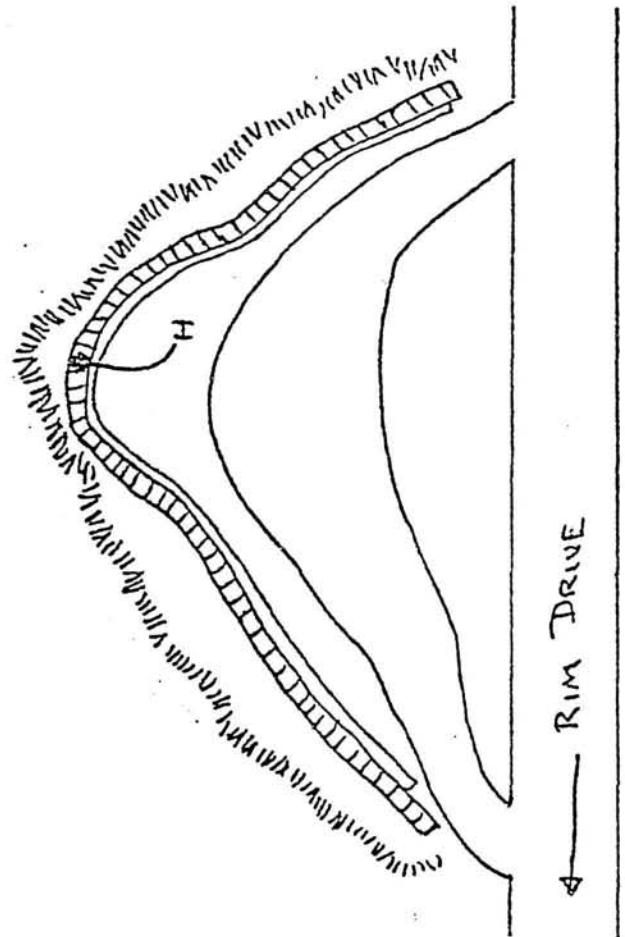
"Grotto Cove" pull out, 14.0 miles from Rim Village. Of those who got out, 40% crossed over the barrier.



RELATION BETWEEN THE VIEW AND THE BARRIER

"Skell Head" pull out, 14.8 miles from Rim Village. Of those who got out of their cars, 95% spend time at the barrier.

- LEGEND
-  Stone wall barriers
 -  Sidewalks
 -  Semi-permeable barriers
 -  Interpretive signs
 -  The Rim edge



IMPLICATIONS FOR MANAGEMENT

If barriers are placed for safety, they may be made more effective by designing them to better meet visitor needs. If we want to keep visitors from crossing over a barrier, it should be placed so that it has the best possible view of the lake and of any other attractions such as interpretive signs. If we also want to keep visitors from sitting or standing on the barrier, it should be separated from the car and placed so that the best possible view is available from the "safe" side.

VISITOR USE PATTERNS

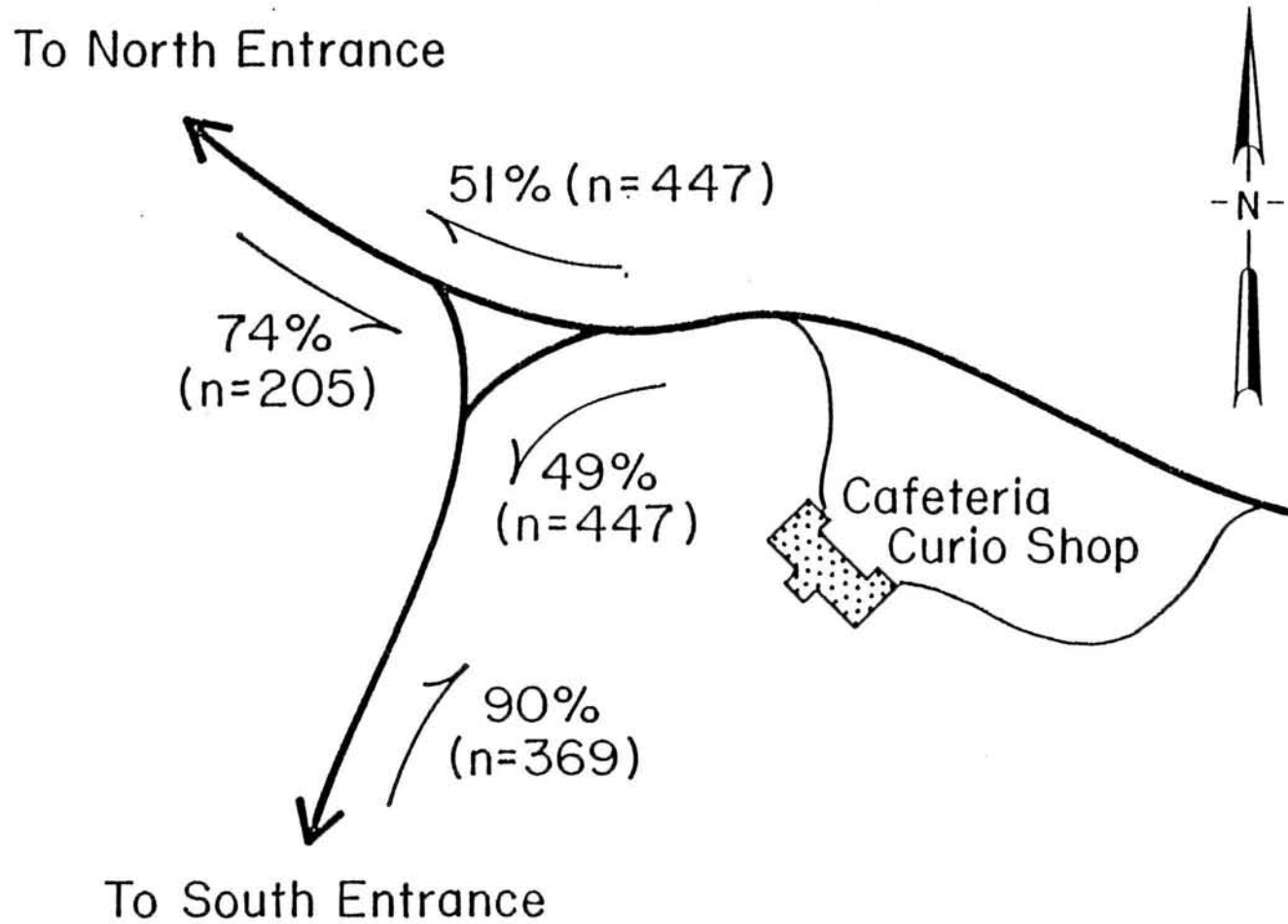
It appears that visitors are not evenly dispersed throughout the park. What roads get the most traffic, and which facilities are the most heavily used? To answer these questions we observed traffic at all the junctions along Rim Drive. Data were collected for half-hour intervals, one interval for each hour of the day. For each junction we determined what percentage of cars arriving there went in each possible direction.

Traffic counts confirm that Rim Village is a center of visitor activity. About 60% of all visitors enter Crater Lake National Park through the Annie Springs entrance station, and for them Rim Village is the first opportunity to view the lake. Observations show that 90% of the traffic from the south enters Rim Village. The 40% of visitors who enter through the North Entrance have many opportunities to view the lake before reaching Rim Village; of this group 74% enter Rim Village (see Figure 16).

At North Junction the road from the North Entrance meets Rim Drive. Most visitors (76%) entering from the north turn south towards Rim Village, probably because it looks as if the "main" road goes that way, signs point this out as the way to Rim Village, and that direction offers the first views

Figure 16

RIM VILLAGE JUNCTION



of the lake. The unmarked pull out just south of North Junction is the first place where visitors entering from the north can see the lake, and because of this almost two thirds (64%) stop here. Only 10% of visitors coming from Rim Village stop at this overlook (see Figure 17).

Observations at Cleetwood Cove provide information about the percentage of visitors who actually hike to the lake and about the percentage of visitors who use Rim Drive. Of those who make it to Cleetwood Cove, 63% go directly onto the one-way portion of Rim Drive. Of the 37% who stop at the parking area, 52% return to North Junction and 48% turn onto the one-way portion of Rim Drive when they leave (see Figure 18).

Continuing on the one-way portion of Rim Drive, 66% of the cars turn off at the spur road to Cloud Cap view point (see Figure 19). There seems to be some confusion here because the observer was asked several times if the road returned to the two-way portion of Rim Drive. A "Dead End" sign might eliminate this problem.

After Cloud Cap the next possible turn off is the road to Lost Creek Campground, Grayback Motor Nature Road, and the Pinnacles. At this junction 36% of the visitors choose the road to the Pinnacles while the other 64% continue on around Rim Drive (see Figure 20). Of the visitors using this road 89% visit the Pinnacles, 26% use the Motor Nature Road, and 6% stop at Lost Creek Campground (see Figure 21).

THE COMBINED PICTURE

By combining observations at different locations we can estimate the percentage of visitors using different roads and facilities in the park. Readers should keep in mind that these are rough approximations which show the relative amount of use in different areas. They assume that all visitors entering the park get at least as far as Rim Village or North Junction.

Figure 17

NORTH JUNCTION

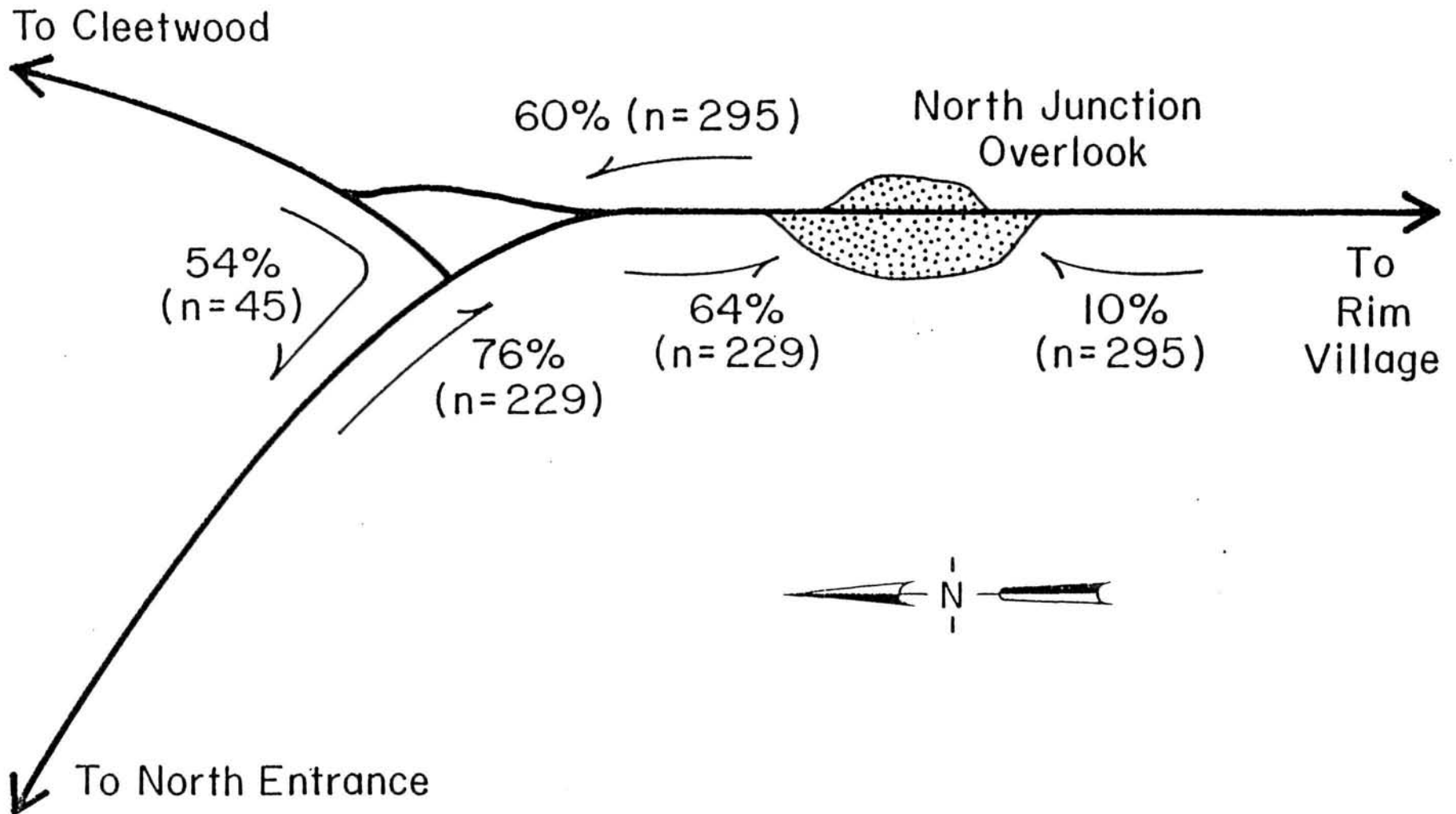


Figure 18

CLEETWOOD COVE

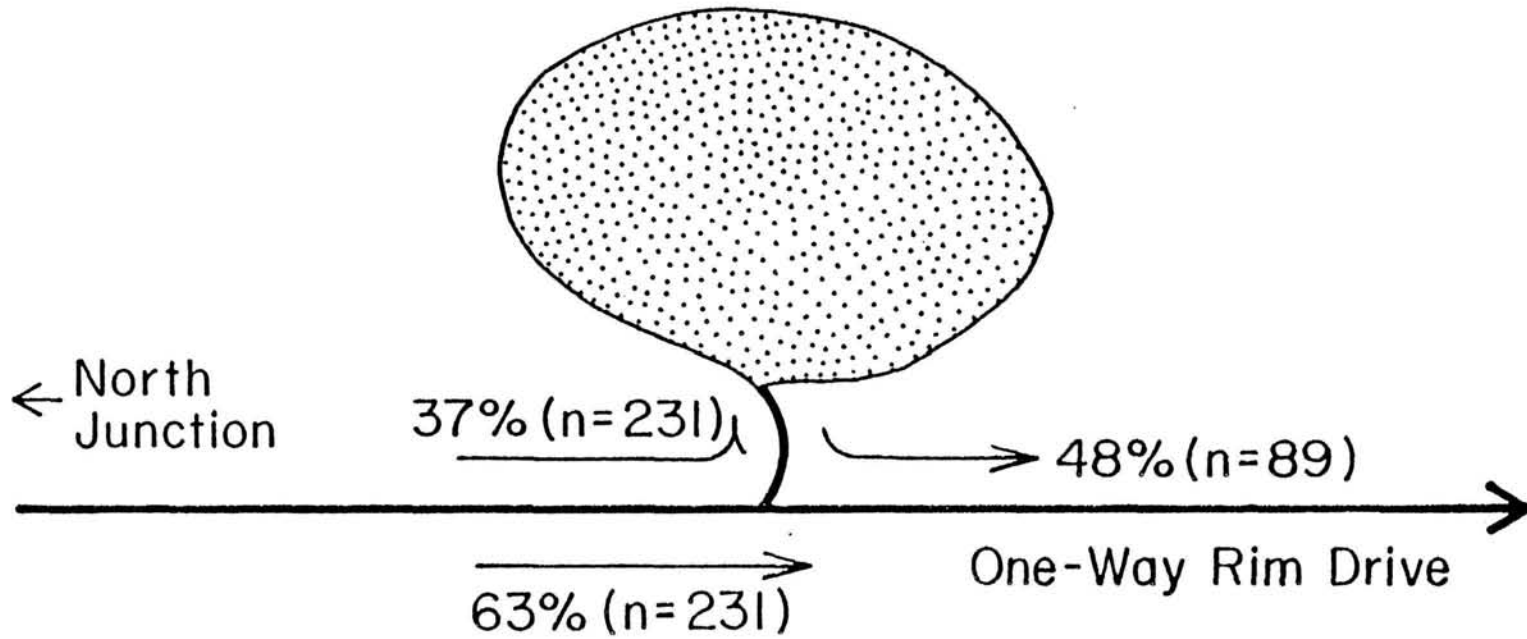
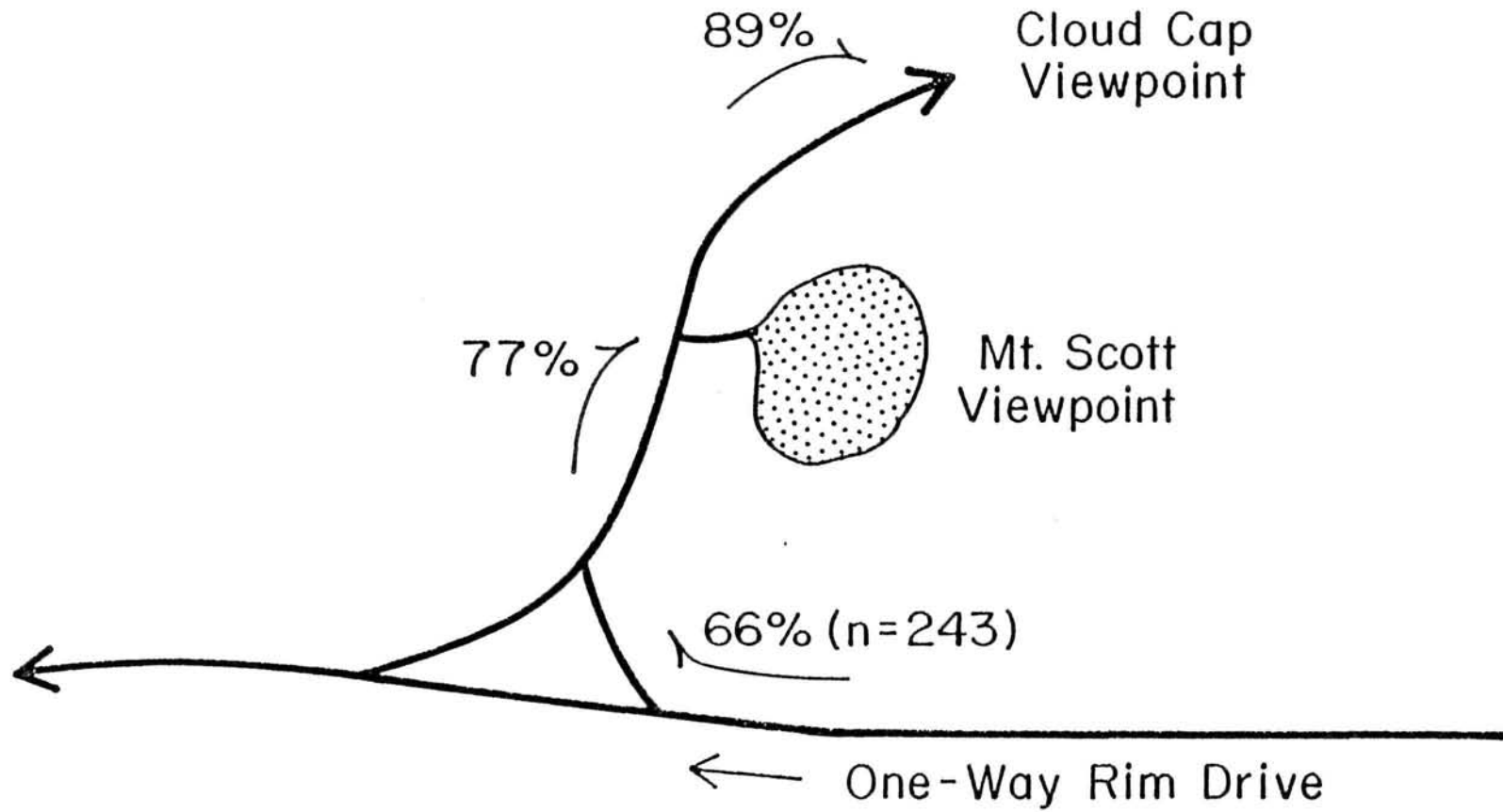


Figure 19

CLOUD CAP



LOST CREEK JUNCTION

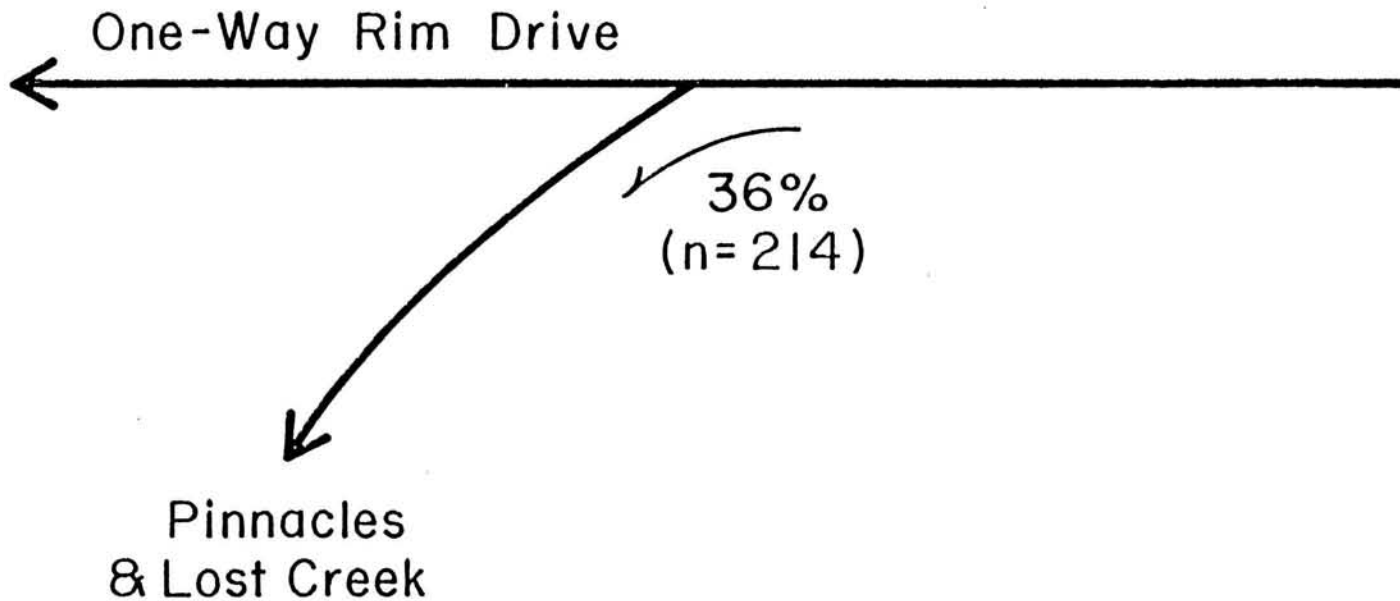
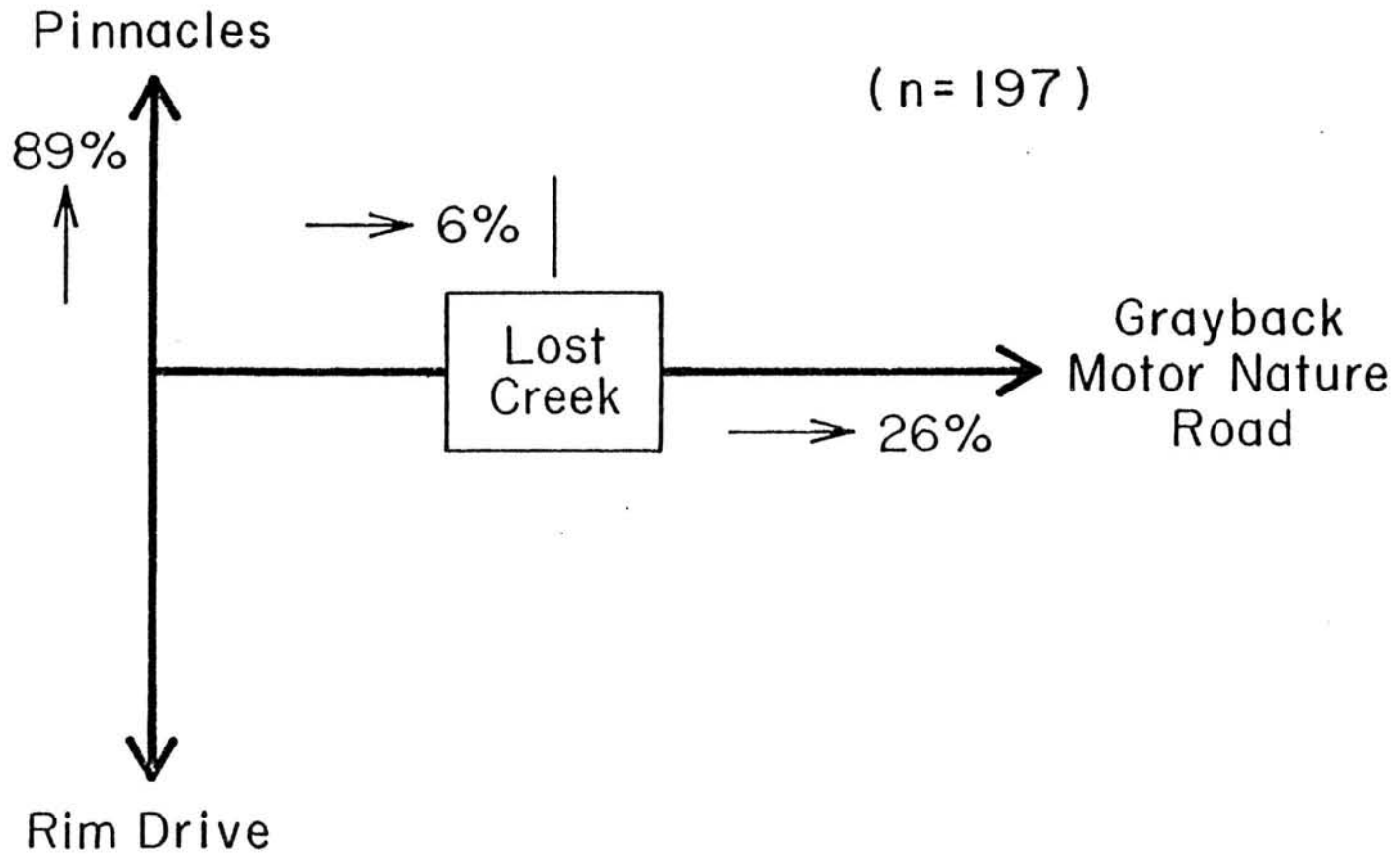


Figure 21

PINNACLES & LOST CREEK



Traffic patterns on Rim Drive are summarized in Figure 22. About 60-70% of park visitors travel the section of road between Rim Village and North Junction, making this the most heavily used segment. The road to Cleetwood Cove is used by 25-30% of all visitors, and the one-way portion is used by 20-25%. About 15% use the Cloud Cap Spur, and less than 10% use the Pinnacles and Grayback Roads.

USE OF RIM DRIVE PULL OUTS

The percentages of visitors using different pull outs around Rim Drive are shown in Table 6. The left column shows the percent of cars going by that stopped, while the right column gives an estimate of the percent of all park visitors using this area (estimates are based on the road traffic estimates discussed earlier). The most used pull outs are the Watchman (28% of all visitors) and North Junction (21%) overlooks.

IMPLICATIONS FOR MANAGEMENT

Distribution patterns show that Rim Village and the Rim Village-North Junction road are centers of visitor activity, which is no surprise. More surprising is the low proportion of park visitors who get around the lake to Cleetwood Cove (approximately 28%) or the one-way portion of Rim Drive (approximately 22%). Pull outs on the one way section receive very little use.

These findings are important in two ways. First, they show where the most people can be reached with interpretive information given current use distributions, perhaps providing a basis for allocating money and effort. Second, they show which areas are currently "off the beaten track." If managers feel that visitors should see such places as the one-way portion of Rim Drive, it might be possible to direct more people to those areas.

Figure 22
Traffic Patterns on Rim Drive

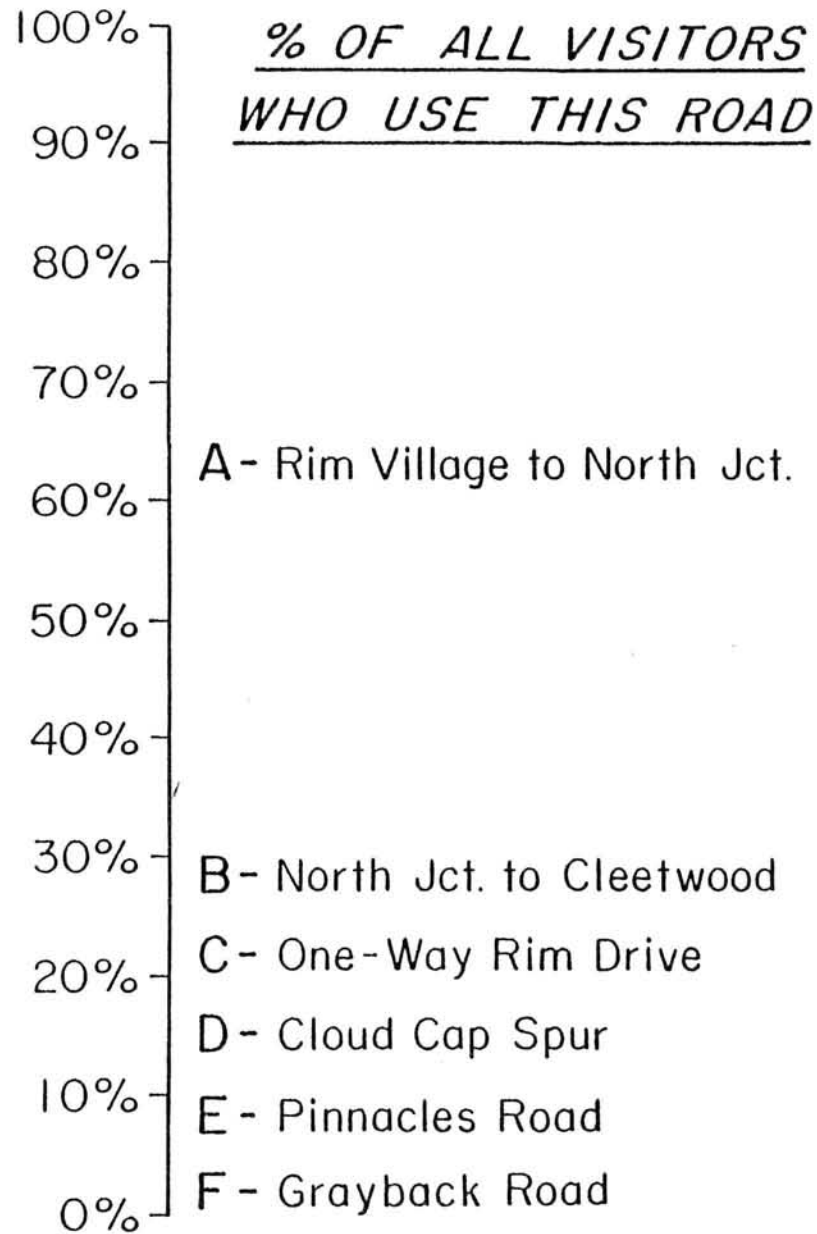
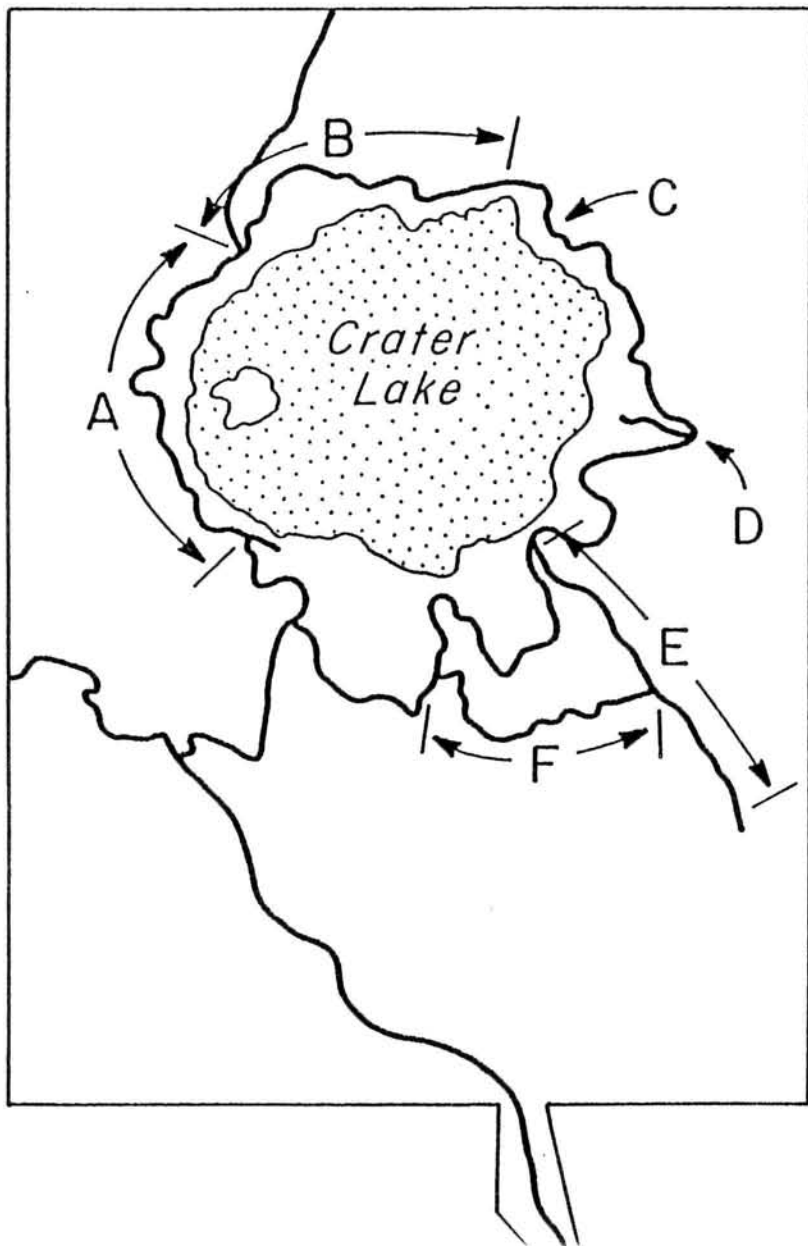


Table 6
Use of Rim Drive Pull Outs

Site	& of cars going by that stopped	% of all park visitors (estimated)
Watchman Overlook	45%	28%
North Junction Overlook	34%	21%
"Skull Head"	61%	14%
Cloud Cap Viewpoint	58%	13%
"Red Cloud Cliff and Pumice Castle"	48%	11%
Wizard Island Overlook	16%	10%
Unnamed pull out .4 miles past "Red Cloud Cliff..."	43%	10%
Grotto Cove	31%	7%
Unnamed pull out next to "What Is Soil?"	30%	7%
Unnamed pull out 1.6 miles from Rim Village	10%	6%
"Cleetwood Flow"	22%	5%
Castle Crest	21%	5%
"What Is Soil?"	10%	2%

VISITOR INFORMATION NEEDS

Providing visitors with information is an important part of the Park Service mission. An old adage indicates that "Nothing is more useless than the answer to an unasked question," and scientific evidence suggests that information has little effect on behavior except when it fits with an individual's needs and motivations. An important part of informing the public, then, is figuring out how to give people the information they need when they need it.

To explore this issue at Crater Lake we asked park personnel to tell us about the questions people ask. At the end of each work day, entrance station, campground, kiosk interpretation, and patrol rangers reported the three most asked questions. Responses were tallied to show the most common concerns of visitors at different sites.

As people enter the park their most common questions concern a place to stay: Are there campgrounds? Where? Are they full? (See Table 7). The next concern is about the location of the lake, a question asked frequently at Annie Springs but not at the North Entrance. We think this is because a sign just before the North Entrance station says "Crater Lake 10," while there is no such sign at Annie Springs. Other visitor concerns include lodging, directions, and fees, but at the entrance stations people appear most interested in finding the lake itself and/or a place to stay.

Once they reach the campground, visitors have some more specific concerns (see Table 8). The most common question is still about the location of the lake, but other questions reflect the need to "get settled." Visitors want to know about such things as firewood, availability of sites, showers, campfire programs, and bears.

Once people get to Rim Village they have questions about finding other things in the park (see Table 9). The most common question asked of patrol rangers in the Rim Village parking area is about the location of Rim Drive;

Table 7

INFORMATION NEEDS: ENTRANCE STATIONS

Question	# Reported
Where are the campgrounds? Are they full?	973
Annie Springs	
Where is the lake? How far?	269
Is North Entrance open?	233
Where's the nearest lodging?	136
Directional questions (i.e. Where do I go from here?)	105
Fee related questions (i.e. How much? Do I have to pay?)	102

Table 8

INFORMATION NEEDS: MAZAMA CAMPGROUND

Question	# Reported
Where is the lake? How far?	282
How do we get firewood?	195
Are there sites available?	145
Are there showers?	72
Are there campfire programs? When?	45
Will I see a bear? Will it get in my tent?	40
How do I get to Rim Village?	40
Where is the closest store?	35
Are there other campgrounds?	10
Do you assign sites?	9

Table 9

INFORMATION NEEDS: RIM VILLAGE PARKING LOTS

Question	# Reported
How do I find Rim Drive?	38
Where's the nearest service station?	28
Where's the trail to the lake or the boats?	25
Where's the lodge?	23
Directions (i.e. How do I get out of here?)	23
Where's the campground?	21
Where's the visitor center?	15

there appears to be a fair amount of confusion because there is no sign at the Rim Village turn off showing the direction of Rim Drive. Other questions involve the location of the service station, tour boats, lodge, campground, and visitor center.

Questions asked in the interpretive buildings are listed in Table 10. The most common questions are about fish and boats in the lake. Beyond this, people want to know about other activities, miscellaneous questions about the lake, and a few directional questions. It is interesting that in general people ask these kinds of "interpretive" questions only at the interpretive facilities and not at other locations.

IMPLICATIONS FOR MANAGEMENT

These findings suggest two major conclusions. First, information needs are not the same for all locations. People at the entrance stations want to find the lake or a place to stay, while those in the interpretive facilities want to know details about the lake itself. It may be desirable to accommodate these differing needs in designing information systems, although this is done to some extent already.

Second, there is a great deal of commonality in the questions asked. For each location, the vast majority of questions concern a small number of topics, and it appears that park personnel answer the same few questions over and over again. For some visitors this provides the only personal contact with park personnel, but it also ties up park employees with simple questions, perhaps preventing them from dealing with more interesting issues. It may be desirable to answer the most common questions with "broadcast" approaches such as signs, brochures, or interpretive talks, leaving the more interesting items for personal contacts.

Table 10

INFORMATION NEEDS: INTERPRETIVE FACILITIES

Question	# Reported
Are there fish in the lake? What kind?	71
How did the boats get into the lake?	59
What else can we do here? Indoors? Trails?	52
Questions about the lake	52
Directions (i.e. How do I get out of here?)	20
Where are the campgrounds? Are they full?	8
Natural history questions	
What kinds of trees are there?	6
What kinds of animals are there? Bears?	4

MAZAMA CAMPGROUND

The General Management Plan for Crater Lake National Park considers some extensive changes in Mazama Campground. Among these are 52 new sites, two new comfort stations, road reconstruction, a concessioner-operated camper services building (i.e. store), and shower and laundry facilities. The addition of these facilities could alter the experience of the campground visitor.

In order to determine present use patterns and assess the need for new facilities, interviews were conducted with campers during the summer of 1979. All the even numbered campsites were sampled one night, the odd ones the next. A total of 307 groups were interviewed over a seven day period.

The first question asked was "How many days do you plan to stay in the campground?" The average stay for those interviewed was just under two days. Forty-six percent stayed one night, 37% two nights, and only 17% stayed three or more nights.

Campers were also asked "Have you made, or do you plan to make, a special trip to Rim Village for the sole purpose of buying groceries?" Most had either come well supplied or purchased their supplies on the way to another point within the park. Many also expressed dissatisfaction with the selection of supplies they found at Rim Village. The most common desire was for perishable items that they could not stock outside the park (specifically fruits and vegetables), and a reliable source of milk and eggs (there were some temporary outages of milk and eggs during this period). In all 14% of the campers said they had made a special trip to Rim Village for groceries. Considering that the average stay is approximately 2 days, this would indicate about 7% or 14 cars per day (if the campground was full) make trips to Rim Village.

Campers were also asked whether they made or planned to make a trip to Rim Village for the sole purpose of buying ice. About 6% said

they made a trip for ice, but most of these were to the Munson Valley service station. Another 6% said they got ice at the same time they bought groceries.

We also asked "Do you plan to attend tonight's campfire program?" Most (71%) said yes. Many of the others said they had already been to campfire programs or were planning to go to the lodge program. It appears that campfire programs are well-attended.

IMPLICATIONS FOR MANAGEMENT

At 1979 use levels,* about 22% of the visitors have the opportunity to stay at Mazama campground. The addition of 52 campsites would raise this to about 28%. Shower and laundry facilities are not currently available within the park, and this may help limit the number of nights most visitors will stay. The addition of shower and laundry facilities could increase the number of nights people stay in the campground, thereby reducing the percentage of visitors who have the opportunity to camp. At present most visitors stay only one or two nights. If the Park Service wants to encourage people to stay longer, shower and laundry facilities may help accomplish this goal.

The justification for a concessioner-operated camper services building is that it "should aid in relieving congestion since campers will no longer have to drive to Rim Village to obtain supplies" (General Management Plan, p. 111-c-8). Data presented here suggest that very few campers (about 14 cars per day) make special trips to Rim Village for supplies. During the 1977 study at Rim Village,

*Average use in 1979 was 2829 people entering the park per day, for the 92 day season from June 1 through August 31. This was a 33% drop from the 1978 figure of 4250 people per day. It is assumed throughout this report that figures would be proportionately higher in a "normal" year.

10% of the cars drove through Rim Village without stopping (an average in excess of 100 cars per day). Combined with the knowledge that the most asked question in Rim Village was "How do I find Rim Drive?" this suggests that better signing and orientation outside of Rim Village might do more to reduce congestion than a camper services store in Mazama campground.