

OHANAPECOSH CAMPGROUND REHABILITATION STUDY

By JANIS M. MOEHRING
& JERRY F. FRANKLIN

For....
the National Park Service
Mt. Rainier National Park
In cooperation with....
the Cooperative Park Studies Unit,
Oregon State University
and
the United States Forest Service
Pacific Northwest Forest and Range
Experiment Station

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by

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TABLE OF CONTENTS

INTRODUCTION -----	1
OHANAPECOSH CAMPGROUND REHABILITATION OBJECTIVES -----	3
OHANAPECOSH CAMPGROUND REDESIGN STRATEGIES -----	4
MASTER PLAN -----	6
MASTER PLAN ANALYSIS	
Section A--Rotten Wood	
Use and Application of Rotten Wood -----	12
Chipped Material -----	13
Rotten Wood -----	14
Application of Nitrogen to Rotten Logs -----	16
Existing Rotten Logs -----	17
Section B--Plant Materials	
Plant Materials -----	18
Trees - Proposed and Existing -----	19
Techniques of Tree transplanting -----	21
Proposed Shrubs -----	22
Techniques of Shrub Transplanting -----	23
Section C--Existing Dead Trees	
Existing Dead Trees (Snags) -----	25
Removing Snags by Blasting -----	26
Cosmetic "Touch-Ups" on Blasted Snags -----	27
Section D--Campground Design Considerations	
Campground Design Considerations -----	28
Paved Trails to Comfort Station -----	30
Proposed Culvert Extending from the Amphitheater to the Creek -----	33
Realigned Campsite Pull-In -----	34
Proposed Extension of Site D-9 -----	35
Proposed Removal of Campsites -----	36
Proposed Stairsteps to Campsite D-11 -----	38

Specifications for Barrier Free Campsites -----	39
Paved Area Around Garbage Cans and Drinking Fountains -----	43
Proposed Redesign of Drinking Fountain -----	44
Signing in the Campground -----	47
Removal of Bollards in the Campground -----	49

RECOMMENDATIONS

Recommendations for Loop D After Rehabilitation Efforts -----	50
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CONCLUSION -----	51
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OHANAPECOSH CAMPGROUND MAP

INTRODUCTION

As with many of the parks and campgrounds across the United States, the Ohanapecosh Campground has been grossly impacted through heavy use. Campers residing in motor homes, trailers, and tents have driven and walked over the whole of the area, gathered and burned "down-wood" from the forest floor, and have hacked and crushed existing vegetation. The forest community finds it difficult to exist with this fierce human element and, as a result, the sight is not a pleasant one. The campground floor has become a dusty mass of exposed roots. Most of the understory plants are gone. Many of the large old trees are dying back and they will also eventually be gone.

We can blame the campers, progress, "Yankee Ingenuity," and, even the weakness of the forest ecosystem. But we--as designers, park managers, administrators, and park employees--are to blame. Poor design has led to a number of problems. Without designated campground paths people become confused and create "short-cuts." The short-cuts lead to soil compaction and the death of many shrubs and herbs. By failing to provide firewood, the camper is forced to go elsewhere for wood, do without, or be gather it behind the ranger's back. Without the down wood, an important soil amendment and seed bed for young trees is lost. Without young trees the reproductive cycle is broken and replacements for old trees are absent.

The forest will be unable to regenerate itself.

As managers, we have contributed to the problem; in turn, we must resolve it. How do we deal with it? There are at least three alternatives:

1. Do nothing.
2. Close the campground and move to a new site.
3. Attempt to rehabilitate the existing campground.

This study is based on a selection of the third option, an alternative favored for both moral and monetary reasons. First, we can no longer afford to cast aside those areas which have been heavily used. We are running out of room--areas such as Mount Rainier which are suited for major campgrounds are limited as is the whole park resource, making a site rotation concept unattractive. Further, the capital investments involved in developing such a site are increasing and will soon, perhaps, reach prohibitive levels. Finally, we have a responsibility to conserve such areas rather than to simply use them up and cast them aside. As has been said, "Use what you need, but save what you can." By conserving and restoring today, we have saved for tomorrow--we have left a legacy for those to come.

OHANAPECOSH CAMPGROUND REHABILITATION OBJECTIVES

The Ohanapecosh Campground Rehabilitation Objectives reflect the ideas and hopes of the Mt. Rainier National Park Administration. Overall, this involves creating a self-perpetuating campground that is functional and, at the same time, aesthetic. Specific subobjectives include:

1. Creation of a regenerating forest environment;
2. Creation of a campground environment that is, in visual aspects, pleasing and which resembles camping in the forest;
3. Utilization of readily available native plant materials and rotten wood in the redesign;
4. Creation of a physically more durable area, less prone to damage by human impact;
5. Creation of campsites offering more privacy than existing sites;
6. Addition of a shrub layer as well as reproductive trees to the campground;
7. Development of solutions to the impact of heavy visitor use;
8. Creation of an area that all visitors, including physically handicapped, can enjoy.

OHANAPECOSH CAMPGROUND REDESIGN STRATEGIES

The Ohanapecosh Campground Redesign Objectives outline the designer's recommendations of the means to achieve the Ohanapecosh Rehabilitation Objectives. The recommendations below establish a minimum of standards to be met in order to achieve any kind of satisfactory results.

1. To transplant large numbers of trees and shrubs during the initial rehabilitation effort.
2. To utilize rotten logs and other coarse woody debris as major elements in creating seedbed and protecting transplants.
3. To utilize chipped woody material and rotten logs by incorporating them into the existing soil.
4. To remove the dead and dangerous trees (preferably by blasting) giving them a "natural" wind-felled appearance.
5. To create a system of hard surface trails through the campground that will define areas for walking, taking the "people pressure" off the area as a whole. The path should meet the Washington Standards for Barrier Free Architectural Design.
6. To provide the campground visitors with firewood for their campfires, thereby reducing the need or desire to remove and use the existing or proposed rotten logs.
7. To realign some of the campground Pull-in sites and omit others.

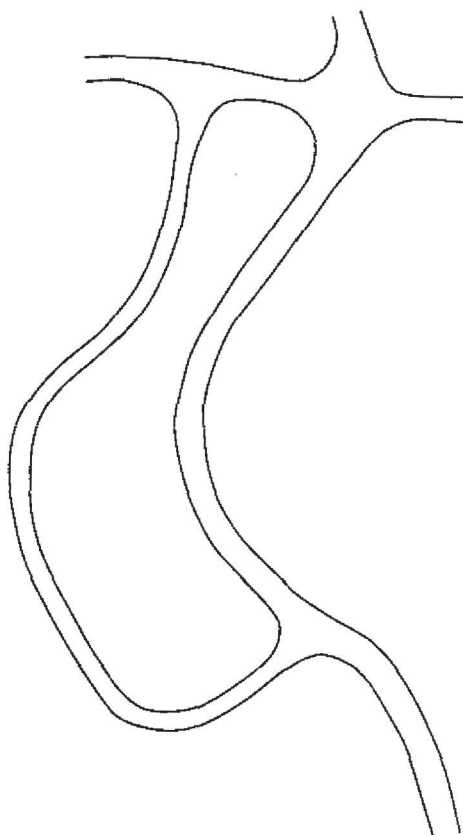
8. To make the campground more accessible to those with physical handicaps by providing paved access to facilities such as water fountains and garbage cans and providing a usable drinking fountain for those with physical handicaps.
9. To channel winter and spring water run-off and snow melt by placing a culvert across the Loop.

In this report we have prepared a plan for the rehabilitation of the Ohanapecosh Campground. It has as primary objectives providing for establishment of new trees and shrubs which will perpetuate and improve the existing forest environment. Recommendations emphasize the use of rotten logs, transplants, and physical alterations which will make the site more usable to all people and, at the same time, make it ecologically viable and aesthetic.

MASTER PLAN

OHANAPECOSH CAMPGROUND REHABILITATION STUDY

MT. RAINIER NATIONAL PARK



REHABILITATION OBJECTIVES

The Ohanapecosh Campground Rehabilitation Objectives reflect the ideas and hopes of the Mt. Rainier National Park Administration. Overall, this involves creating a self-perpetuating campground that is, at the same time, functional and aesthetically rehabilitated. Objectives include:

1. Creation of a regenerating forest environment.
2. Creation of a campground environment that is, in visual aspects, plantings, and which resembles camping in the forest.
3. Utilization of readily available native plant materials and cotton wood in the replanting.
4. Creation of a physically more desirable area, less prone to damage by human impact.
5. Creation of campsites offering more privacy than the existing sites.
6. Addition of a stock layer as well as reproductive trees to the campground.
7. Development of solutions to the impact of heavy visitor use.
8. Creation of a regenerating forest environment.

JANIS M. MOERKING, DESIGNER

for the National Park Service
Mt. Rainier National Park
In cooperation with
Oregon State University
Corvallis, Oregon

REDESIGN STRATEGIES

The Ohanapecosh Campground Redesign Strategies outline the designer's recommendations of the means to achieve the Ohanapecosh Rehabilitation Objectives. The recommendations below establish a minimum of standards to be met in order to achieve any kind of satisfactory results.

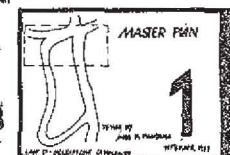
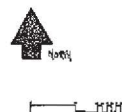
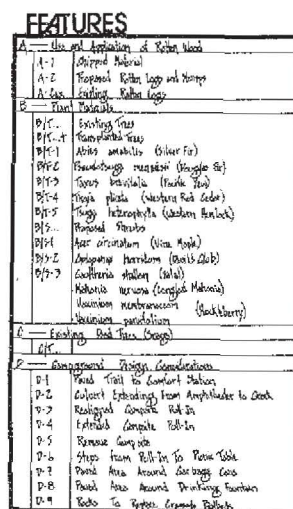
1. To transplant large numbers of trees and shrubs during the initial rehabilitation effort.
2. To utilize cotton logs and other coarse wood debris as major elements in creating "seedbeds" and protecting transplants.
3. To utilize clipped woody material and cotton logs by incorporating them into the existing soil.
4. To remove the dead and dangerous trees (particularly by blowings) giving them a "natural" wind-taken appearance.
5. To create a system of hard surface trails through the campground that will define areas for walking, taking the "people pathway" off the area as a whole. The path should meet the recommended guidelines established by the Washington State Building Code Authority Council on Regulations for Barrier Free Facilities.
6. To provide the campground visitors with firewood for their campfires, thereby reducing the need or desire to remove and use the existing or proposed cotton logs.
7. To design some campgrounds.
8. To make the campgrounds more accessible to those with physical handicaps by providing ramp access to facilities, roads, as well as parking areas and providing a suitable drinking fountain for those with physical handicaps.
9. To channel water and springs, water runoff and snow melt by placing a culvert across the loop.



MASTER PLAN
LOOP D

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OHANAPECOSH STUDY



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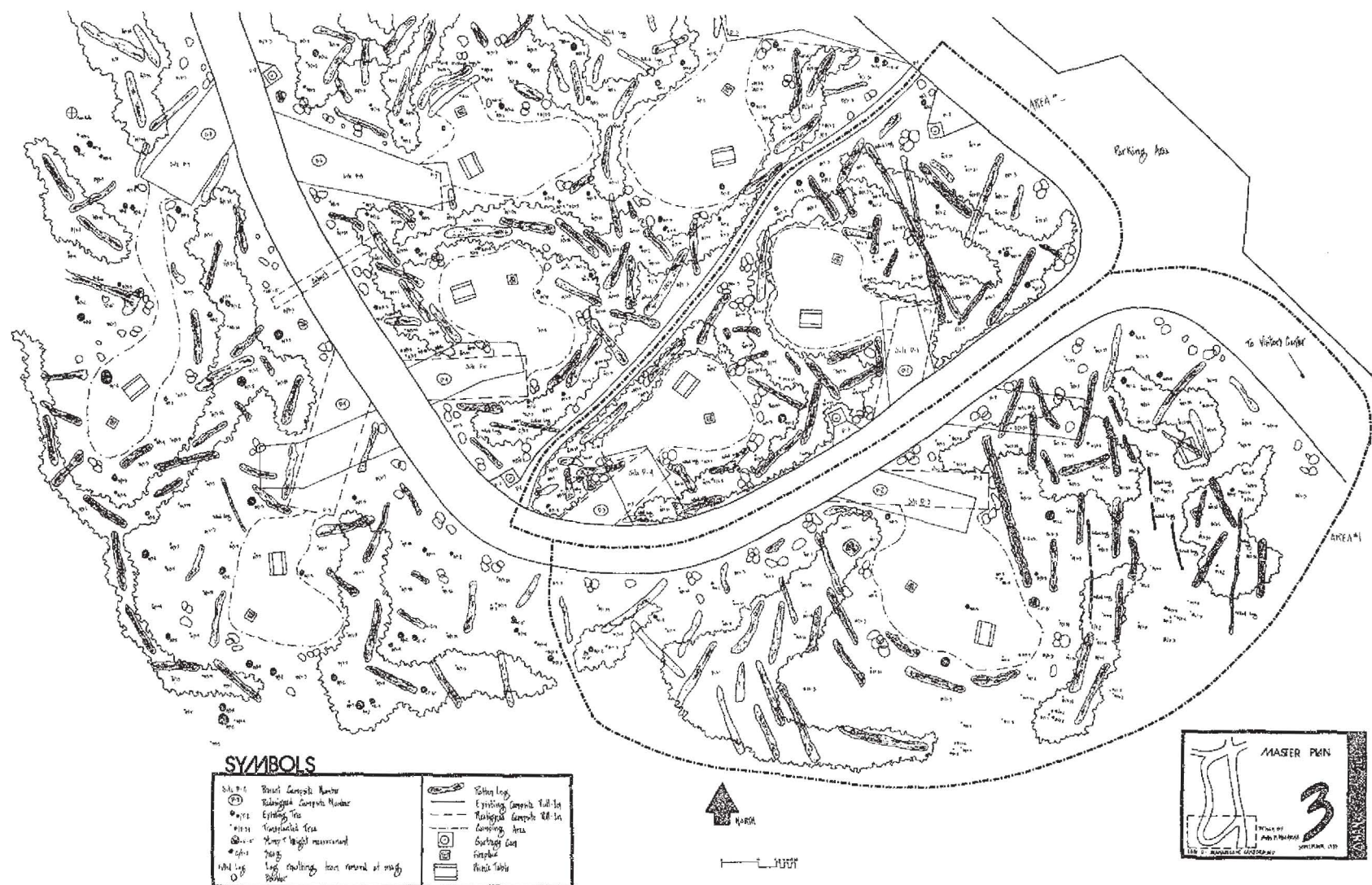
4) Collected material will be broadcast and food sorted into the various components from this they will not have specifically shown as such on the computer disc.

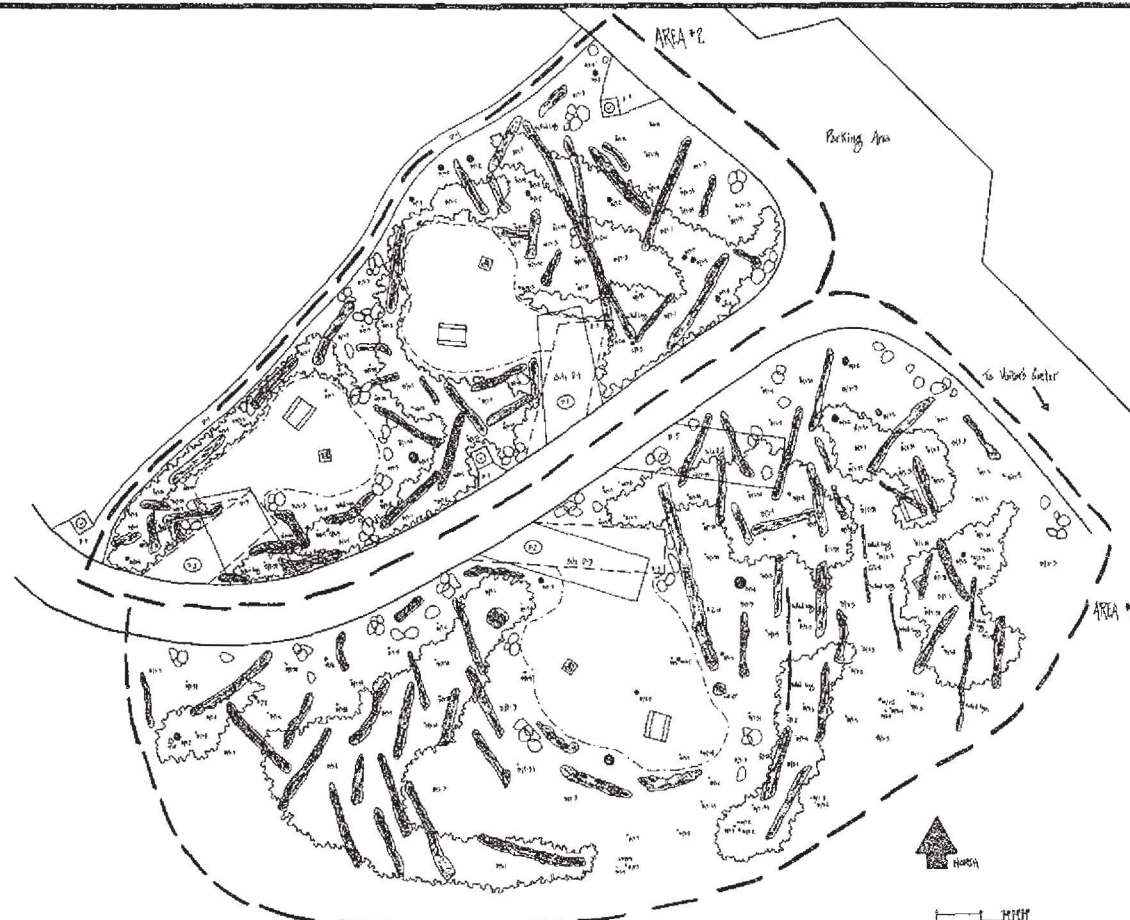
5) 1st the computer training should not exceed 7 or 8 weeks.

6) 2nd) Then 4 groups will be chosen, 1st group, 2nd group, 3rd group, 4th group, and 5th group. These groups are to be randomly selected. Spacing should not exceed 8 or 10 weeks.

7) 3rd) They are to be told by meetings or other means. The social training from the release of the group, is to be used on group 2, and then then shown on the 3rd group or 4th group.







MATERIALS LIST

#	Type of Material	100'	200'	300'	400'	500'	600'	700'	800'	900'	1000'	Total Area
AREA #1												
101	Existing Road		24		48	72	96					240
102	Proposed Road											
AREA #2												
201	Existing Road		6		12	18	24	30	36	42	48	252
202	Proposed Road											
Vegetation												
#	Type of Plant	AREA #1		AREA #2								
301	Aspen	1525		826								
302	Aspen	1525		826								
303	Aspen	1525		826								
304	Aspen	1525		826								
305	Aspen	1525		826								
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MASTER PLAN ANALYSIS

SECTION A

ROTTEN WOOD

USE AND APPLICATION OF ROTTEN WOOD

Rotten wood can be defined as trees that have, by some means, fallen to the ground, become prey to insects, and have begun to decay. In the forest, this wood plays a major role in plant existence and regeneration of plants. The decaying material forms a substrate that is not only ideal for young seedling trees, but exclusively preferred by some tree species. It is a source of organic material, which is important in improving the soil structure. In addition, rotten wood also serves as a protective element for the existing tree roots, by providing a layer of "cushioning", so to speak. Studies have shown that with a decrease in rotten material on the forest floor, a decline in the regeneration of trees, shrubs, and herbs will result. Lack of vegetative regeneration means the eventual "death" of an area.

In Loop D, two kinds of rotten material will be experimented with, "transplanted" rotten logs and chipped material (vegetative material that has been finely ground by a chipping machine).

CHIPPED MATERIAL

Chipped material is to be spread over the area and, if possible, carefully hand spaded into the ground. By applying it in this fashion, the hard and impermeable top layer of soil will be penetrated, allowing water to soak into the ground instead of running off or puddling.

A very feasible and aesthetically pleasing alternative would be to create rolling mounds or berms with the chipped material that could be planted. Not only would these give an added area for plant regeneration, but they would also be attractive and help regulate the flow of traffic. (The above alternative is now shown on the Master Plan because a base map of that detail was not available to work from.) It is recommended that if this alternative is accepted, the construction be supervised by a Landscape Architect.

ROTTEN WOOD

Rotten wood, in the form of logs, should be placed as specified in the Master Plan. The degree of decay of the wood is not specified, primarily because it has not been determined how rotten logs can be and still feasibly be moved from one area to another. It has been speculated that Class 4 logs (logs that have reached the stage of decay so as to have moss, fungus, and plants growing on them but still have enough strength to bridge) would be the best to use. A more direct guide is to use the most rotten material that can be used since it is most useful as seedbed and least attractive as firewood. Similarly, the most rotten logs are more likely to have trees and shrubs already established on them. Selection of such logs is particularly desirable since it provides for "instant" live transplants with the log.

The logs are specified according to size in length. Diameter is not given, although it is recommended that logs two feet in diameter and over, be used; smaller logs may be more trouble to move than they are worth. Small logs (five feet long and under) can be transported in the bucket of a front end loader. Larger pieces can be lifted from the ground, wrapped in a sling, and transported to the site. The most important consideration is to do as little damage as possible to the vegetation already existing on the decayed logs. The vegetation will provide transplants, instant cosmetic assistance and deters visitors wishing to climb on the logs.

In placing the logs in the campground, two alternatives have been suggested. One is to set the logs on top of the ground and plant around them. The other is to bury the logs halfway into the soil. This would be more difficult but would reduce the visual impacts to the loop--in contrast to the "domino-like" appearance of large logs scattered around the campground floor. Care would need to be taken so as not to damage any of the existing tree roots, which would limit the areas where logs could be buried.

Another method of accomplishing the "half-buried look", would be to saw the logs in half lengthwise and set the halves on top of the ground. Existing tree roots would not be disturbed with this method. The time involved in sawing the logs may not merit the added convenience of being able to set the logs on top of the ground, however.

The Master Plan calls for snags or (rotten) stumps to be transplanted into the Loop. To achieve a "natural" look, it would be best to consider only those stumps that have been wind-felled and are well along in the decaying process. The "best" type of material to use, both aesthetically and practically speaking, would be a stump two to five feet tall with a diameter of one and one-half to two feet that has moss and/or plants growing on or in it. A tree spade can be used to move the stump into the campground. It can be planted as though it were a tree. Using stumps or snags will create small focal points in the Loop adding a visual change.

APPLICATION OF NITROGEN TO ROTTEN LOGS

It is known that nitrogen is an important element in the decomposition of organic matter. Although the precise effect of added nitrogen on rotten or partially rotten wood is unknown, we can assume that it would speed up the decay process. If so, then in projects of this nature, logs that are not as decayed (and easier to transport) can be used and treated with nitrogen to hasten decay. To obtain the same aesthetic benefit as a well rotted log, the younger log can be planted with moss and the moss seeded with herbs. Holes can also be bored in logs and tree seedlings planted.

How much the decay process can be accelerated is not known. To determine the effects, we recommend that nitrogen be applied to a percentage of the logs used in Loop D. Oregon State University staff are prepared to provide recommendations for such a treatment.

EXISTING ROTTEN LOGS

Although they are sparse, a few down and rotten logs exist in Loop D. They will be left in their present locations with one exception. One of the logs is lying too close to the fire pit in Site D-6. It will be moved north approximately four feet.

In essence, the redesign will incorporate the existing rotten material into the final plan.

Additional trees (dangerous and/or already dead) will be felled. This should be done prior to implementation of any transplanting. The resulting logs are also incorporated into the plan including the specific desired locations. These logs are of special importance because, while essentially undecayed, they are long and often large in diameter. The total log volume obtained by felling a dangerous/dead tree will also be much greater than that of the largest log that could be transplanted into the campground.

SECTION B

PLANT MATERIALS

PLANT MATERIALS

One of the most prominent features of the this plan is the addition of plant materials to the loop. At the present, the loop is nearly devoid of shrubs or young trees. The soil in Loop D has become so compacted that the existing trees fail to regenerate.

Since there are few trees in the Loop other than "old" ones, (200 years old +) young trees (10 to 50 years old) will be transplanted. They will provide an "intermediate" age class between the existing and seedling trees.

Shrubs will be transplanted into Loop D in an effort to create a more suitable environment for plant regeneration.

TREES - PROPOSED AND EXISTING

Five species of trees exist in Loop D. They are listed below as they are classified in the Master Plan.

B/T-1 Abies amabilis (Pacific fir)

B/T-2 Pseudotsuga menziesii (Douglas-fir)

B/T-3 Taxus brevifolia (Pacific yew)

B/T-4 Thuja plicata (Western redcedar)

B/T-5 Tsuga heterophylla (Western hemlock)

Douglas-fir is the dominant species in the loop, with western hemlock running a close second. Pacific silver fir, yew and western redcedar are present in lesser amounts. These trees are all about 200 to 250 years old. Very little, if any, regeneration has occurred. To insure that this campground will remain a vegetated area, younger trees must be present to replace the older ones.

In the redesign, western hemlock and Pacific silver fir will be transplanted in the greatest numbers. Both are shade tolerant species occurring naturally on the site. Douglas-fir will not be transplanted into the Loop. It is not a shade tolerant species and would not survive to reach

maturity.^{1/} Pacific yew is also of limited use here because of its limited crown (screening value), a poor structure which results in cracking and splitting in older trees, and low resistance to visitor trampling. Western redcedar will receive some use in the redesign, and might be more extensively used elsewhere.

^{1/} In order to perpetuate Douglas-fir it would be necessary to create small openings (perhaps one as small as 1/4-acre in size would be sufficient). The park may want to consider this possibility elsewhere in the campground. One strategy could be to enlarge openings associated with road edges or pockets of tree mortality to obtain open sites of sufficient size.

TECHNIQUES OF TREE TRANSPLANTING

The trees that will be brought into Loop D will be moved from their present location with a tree spade. The size of the spade will limit the size of trees that are moved. Most likely, this will limit the transplanting to nothing larger than ten to fifteen feet in height with a caliper no greater than three to four inches.

Tree roots are relative in size and extent to the above ground portion of the tree. When transplanting, it is important to move most, if not all, of the root system. This factor will restrict the size of plants transplanted, as severing the root systems to a great extent will decrease the survival rate.

To reduce transplanting shock, the trees should be moved in the fall, winter, or spring while the tree is still dormant.

It is imperative that the transplanted trees come from areas with similar site characteristics such as soil type, elevation, and climatic conditions. Trees brought from unsimilar areas will have a decreased rate of survival. This situation of transplanting the tree into an "unfamiliar" area will force the plant to adjust faster than it is able possibly resulting in death or severe stunting.

In transplanting the trees, the first step is to locate where the tree is to be planted, and to dig the hole. The tree can then be dug, moved, and planted in its new location, all in one operation. This will also add to the survival rate.

PROPOSED SHRUBS

Loop D can be very generally classified as a Western Hemlock/Vanillaleaf vegetation type. In this community, the most common shrub is vine maple which provides up to 60% cover in some stands. As can be seen in the Master Plan, vine maple is to be very generously planted throughout the Loop. This shrub has a dense habit of growth that will discourage pedestrian travel. It is also a taller plant and will provide screening between the sites, giving the campers more privacy.

Other shrubs are not as common, but four will be used in the loops. They are: salal, Oregongrape, and two varieties of huckleberry. They are to be randomly planted to give a "natural" appearance. The spacing should not, however, exceed 18 inches on center.

In addition to the above shrubs, one other plant will be used--Devil's Club. It occurs on wetter sites and, because of its spiny nature, is a good barrier plant. It will be used in the northwest corner of the loop in Site D-17 (by the creek).

TECHNIQUES OF SHRUB TRANSPLANTING

The shrubs to be used in this project are:

B/S-1 Acer circinatum (Vine Maple)

B/S-2 Oplopanax horridum (Devil's Club)

B/S-3 Gaultheria shallon (Salal)

Mahonia nervosa (Oregongrape)

Vaccinium membranaceum

(Huckleberries)

Vaccinium parvifolium

The method of transplanting will be the same for all of the shrubs.

The best time to transplant is when the plants are dormant (in the fall, winter, or early spring).

When digging the plants, care should be taken so that as little damage as possible is done to the root systems. If the plants have to be moved a long distance, the root systems should be covered in some fashion to reduce moisture loss. One way is to "heel them in" in the bed of a pick-up truck (i. e., place the shrubs in the bed of the transport truck and cover the roots with dirt.) The dirt that is brought with the shrubs can be used in planting and will serve as "transition soil" to help the plants better adjust to their new environment. (Its use is described on the following page.) Another

method of transplanting is to dig the plants and place the roots in a plastic bag. At the site, they can be planted as usual.

The following summer, the shrubs should be watered every other week to increase the survival rate.

SECTION C

EXISTING DEAD TREES

EXISTING DEAD TREES (SNAGS)

Fifteen dead trees or snags exist in Loop D. From a management standpoint, this presents a very definite problem. By leaving the snags standing, the Park is open to lawsuits should the dead trees fall and possibly inflict damage. If they are felled, another question arises--how is this removal accomplished? Usually, the park manager chooses to remove these "decadent" trees. In the past, the method of removal has been with a chain saw. This method does not leave a "natural-looking" result.

As an alternative to the chain saw, explosives have been used in some parks with limited success. The result is a stump that looks as though the tree was wind broken.

REMOVING SNAGS BY BLASTING

Removing snags with dynamite or "creative blasting", so to speak, is a relatively new practice. It has been used at the Olympic National Park and to a limited extent, at Mount Rainier National Park. Successes, gauged by the aesthetic value of the finished product, have also been limited. The end result depends on the location and kind of explosives used.

The best type of explosive to use is a mixture of 96% ammonium nitrate and 4% fuel oil. It is a "Class C" explosive, which means it is relatively safe in comparison to other explosives on the market. This mixture is "non-cap sensitive" and is, instead, primed with a high velocity primer. It is also water sensitive; water neutralizes the effect of the mixture. Using this explosive results in a lot of heaving action which is important in shooting stumps.

When blasting large trees (over 50 feet high), it may work better to first fall the tree with a chain saw, leaving a four- to five-foot high stump. A chain saw will give better control as to where the tree bole and top will land. This material should be placed in the loop as specified in the Master Plan. The top of the remaining stump can then be "aesthetically blasted".

COSMETIC "TOUCH-UPS" ON BLASTED SNAGS

After the snags have been blasted, another problem arises--the resulting stumps look too freshly broken or fallen. It would be fine if there were only one or two fresh snags, but 15 in a small 2 acre loop are too many to look natural. There are several alternatives for "weathering".

To give the stumps a "weathered" look, a mixture of dirt, charcoal, and water could be sprayed on them. Holes could be drilled and plants such as salal or Oregon Box could be planted in them.

Another method of "rapid aging" would be to spray or paint the stump with one (thin) coat of a driftwood grey stain. Although it is not a "natural" approach, it would work well and remain on the stump longer than the water, dirt, and charcoal mixture. It could also be planted on for an even more "natural" look.

It is not necessary that all of the blasted trees be treated. Probably seven to eleven stumps are sufficient.

As an extension of this experiment, one or two of the stumps should be treated with nitrogen as was described earlier. The nitrogen would act to break down the stump faster than by nature.

SECTION D

DESIGN CONSIDERATIONS

CAMPGROUND DESIGN CONSIDERATIONS

In order to achieve favorable long-run results from this project, certain design problems need to be corrected. A system of trails through the Loop to the Comfort Station are essential. Without them, efforts at rehabilitation would meet the same end as natural regeneration--death by trampling.

Along the trails, a system of communication must exist to inform the visitor of the whereabouts of the campground facilities. In addition to providing invaluable information, the signs will also protect the plants, encouraging visitors to use the provided paths.

Other design considerations are the campsites. One of the pull-ins is too short, most of them need to be realigned, and several campsites should be omitted entirely. One site utilizes tree roots as steps to the picnic table and firepit!

Unfortunately, design problems aren't limited to the summer season. In the winter, a stream of melting snow or rain runs from the amphitheater across Loop D to the creek. This water will wash out any rehabilitative efforts in its path unless the "stream" is channeled into a culvert and controlled.

Finally, there is the important question of redesigning certain facilities to accommodate the physically handicapped. The present drinking fountain is inaccessible (as well as unsuited) to

persons confined to wheelchairs. The same problem exists with the garbage cans.

It is my feeling that at least one, of not several, campsites should be provided that would accommodate the handicapped. The International Symbol of Access, posted with the Campsite number, would depict these sites. The only alterations to the campsite would be to replace the low firepit with a standing grill, and possibly replace the picnic table with one more accessible. Each site will be a different situation, but some of the camping areas may need to be leveled or even possibly surfaced to allow wheelchairs to pass over them.

PAVED TRAILS TO COMFORT STATION

At the present time, there are no trails through the loop to the Comfort Station. To the visitor, this becomes a game of "find the most mud-free, easiest, or quickest route to the restroom". This game has been an important factor in campground deterioration.

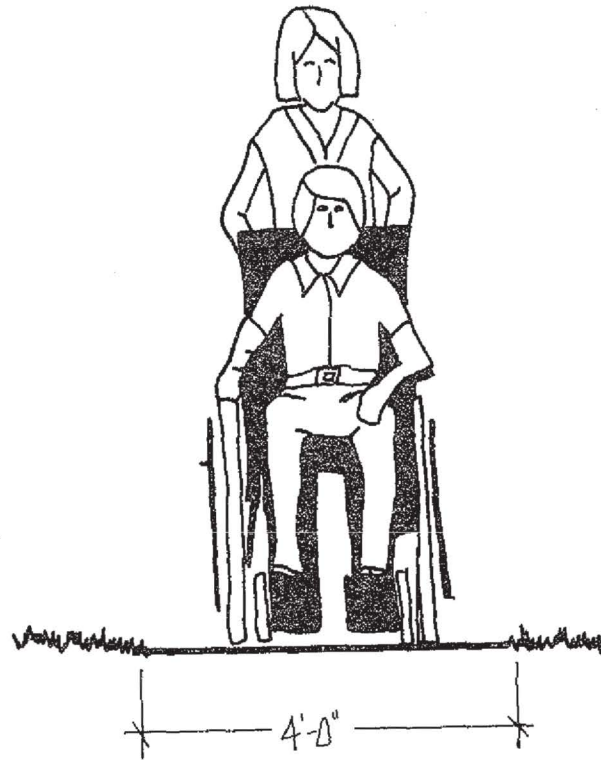
In a "normal" campground situation, trails not only provide access to various points, but also keep people off of other areas. These undisturbed areas become islands of regeneration. Leaf litter and twigs accumulate. Shrubs, herbs and seedling trees begin to grow. Small animals find suitable habitat.

This is not to say that adding paths will eliminate visitor traffic through these islands. That is nearly impossible to achieve. Paths will, however, greatly decrease the use of these "island" areas.

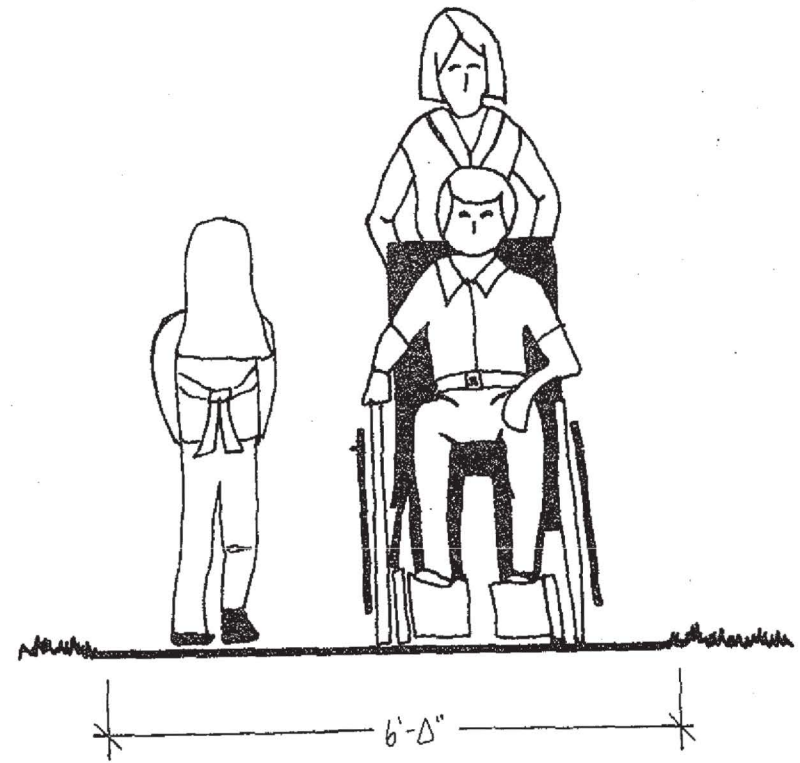
Three paved paths are recommended for the loop at locations shown on the Master Plan. Concrete is the best type of surface to use. A brown stain could be added to the mix to make the path appear more natural. Soil cement and asphalt are alternative surfaces, but neither are recommended since they will break down faster than concrete under continued use and cold winters.

To meet the recommended guidelines established by the Washington State Building Code Advisory Council on regulations for Barrier-Free Facilities the path must be a minimum of four

feet wide for one-way traffic. The minimum width as specified by the U. S. Department of Housing and Urban Development for 2-way traffic on the path is 5'6" with the preferred width being 6'0".



RECOMMENDED ONE-WAY



RECOMMENDED TWO-WAY

PATH WIDTHS

PROPOSED CULVERT EXTENDING FROM THE AMPHITHEATER TO THE CREEK

One of the most serious threats to campground rehabilitation occurs during the winter and early spring--runoff from heavy rains and snow melt. In Loop D, water runs from the amphitheater across the road, through the loop and emptys into the creek. Unless this water is channeled and controlled, it will destroy any plantings in its path.

It is recommended that a culvert be installed beginning at the west side of the amphitheater and running northwest to the creek. This should be no problem, since it is a gradual downhill slope to the creek. The water, when channeled, will take a shorter route to the creek than before. This new course will turn in the same general direction as the northern most proposed path.

If the central portion of Loop D is not to be rehabilitated immediately, the installation of the culvert can be delayed. The run-off affects only the central area of the loop. It is, however, an important consideration for the future.

REALIGNED CAMPSITE PULL-IN

Many of the campsite pull-ins in Loop D are at an angle that makes them difficult to use. Minimal alterations will make backing into many sites much easier.

It is recommended that campsites be realigned as specified in the Master Plan. In a few instances, this will be a major change requiring that the old pull-in be either partially or entirely removed. In other cases it simply means that more gravel or a barricade (such as a rotten log or boulder) be added.

PROPOSED EXTENSION OF SITE D-9

At the present, the pullout at site D-9 is only 10 feet long, which is too short to accommodate most campers. The only physical factor that limits the extension of this site is a drop of several feet at the west end or back of the site. To extend it as specified in the Master Plan, would require using fill dirt and possibly rocks, which seems very feasible.

In all other aspects the campsite is a good one, so removal of the site would not be a recommended alternative.

PROPOSED REMOVAL OF CAMPSITES

In the Master Plan, existing campsites D-2, D-31, and D-30 are to be removed. The reasons for this recommendation are discussed below.

Existing site D-2 is located in the southeast corner of the loop. It has frontage on both roads which makes it an undesirable site from a privacy standpoint. It is also located uncomfortably close to site D-3. It is out of the direct flow of foot traffic which would make it an ideal area to encourage an island of plant regeneration. The existing features such as the picnic table, firepit, and campsite pull-in would have to be removed. The scars would be covered as specified in the Master Plan with rotten logs, boulders, and plant materials.

Existing site D-31 is in much the same situation as site D-2. It is located in the northeast corner of the loop and also in fronted by two roads. It is located much closer to the road than either of the other sites. This site could be classed as one of the most "undesirable sites" in Loop D, and it is usually one of the last to be filled. It too is a prime area for plant regeneration. The same plan of action would be used for removing the picnic table and covering the scars as was recommended for site D-2.

Existing site D-30 has problems similar to those of sites D-2 and D-31. It is quite close to the road on one side and the amphitheater on the other. It is not subject to foot traffic, which makes

it an ideal area to combine with site D-31 for creation of a large "island" of plant regeneration.

Again, rotten logs and plant materials would be brought in to facilitate regrowth and hide any signs of site furniture that might remain.

PROPOSED STAIRSTEPS TO CAMPSITE D-11

Site D-11, located in the far northwest corner of the loop, has a special problem. The campsite (firepit and picnic table) are separated from the pull-in by an elevation drop of about 7 feet. Presently, the path to the campsite is a muddy route with exposed tree roots as stairs. To eliminate this wear and tear on the trees, I recommend that about 7 railroad tie "stairs" be placed in the path to replace the tree roots. It will be much safer as well as help the trees.

SPECIFICATIONS FOR BARRIER FREE CAMPSITES

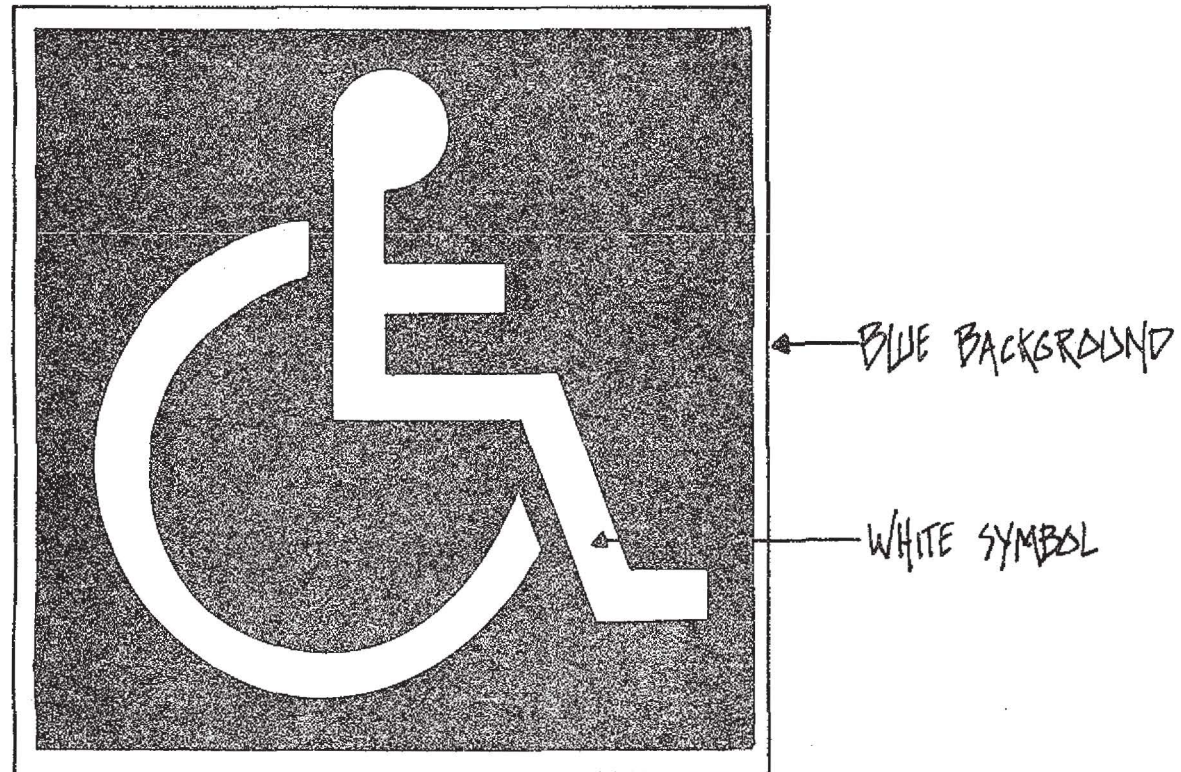
If only one site is chosen for conversion to barrier free, Site D-19 would be the best choice. It is located on the same side of the road and close to the Comfort Station and Amphitheater, which makes it ideal. Additional desirable sites are D-20, 21 and 22. They should be marked with the International Symbol of Access (see next page).

To make the present sites barrier free requires little work. They need to be examined to determine if they are level and smooth enough to permit passage of wheel chairs. If unacceptably rough, they will need to be smoothed or possibly surfaced with concrete or blacktop. A brown stained concrete would give the most "natural" appearance and would match other campground surfacing.

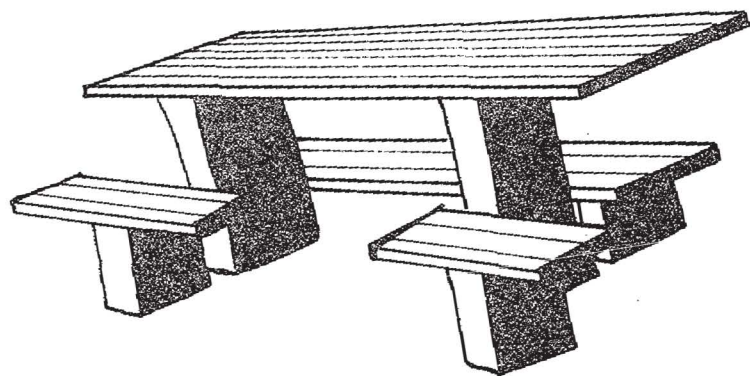
The firepits are not designed for use by people in wheelchairs. They are too low to the ground. An alternative is replacement of the fire pits with a standing grill 18-24 inches off the ground. The existing firepits could also be left and the standing grill simply added. This would allow the user a choice.

The existing picnic tables are passable, but a better table does exist and is illustrated on the following pages. Most important is existence of a minimum of 29 inches of space between the ground and the table bottom to permit a wheel chair to slip under it. Present tables accommodate

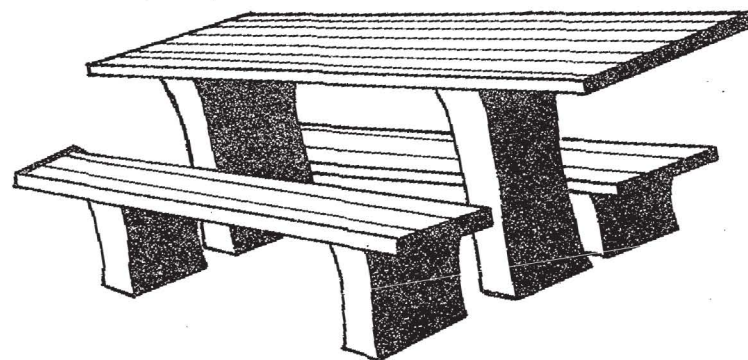
a wheel chair at either end, but do not permit two people (one or both of which are confined to wheel chairs) to sit across from each other. New tables would allow a person confined to a wheel chair to function "normally".



INTERNATIONAL SYMBOL of ACCESS



WHEEL CHAIR ACCESS ON MIDDLE SIDE
OF TABLE



WHEEL CHAIR ACCESS ON END AND
SIDE OF TABLE

PICNIC TABLES ACCESSIBLE TO HANDICAPPED INDIVIDUALS

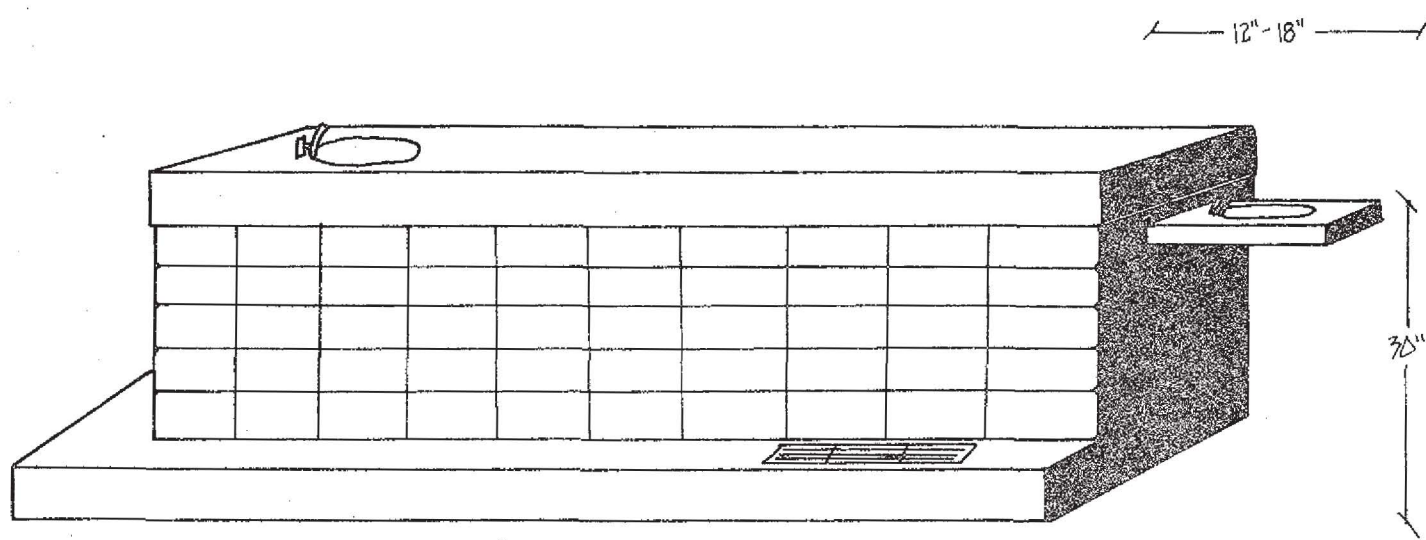
PAVED AREA AROUND GARBAGE CANS AND DRINKING FOUNTAIN

To comply with the recommendations set forth by the U.S. Department of Housing and Urban Development, the area around the garbage cans and the drinking fountain should be paved as specified in the Master Plan. This will permit their use by people confined to wheel chairs. The surfacing should be of the same material as the proposed paths through the campground loop.

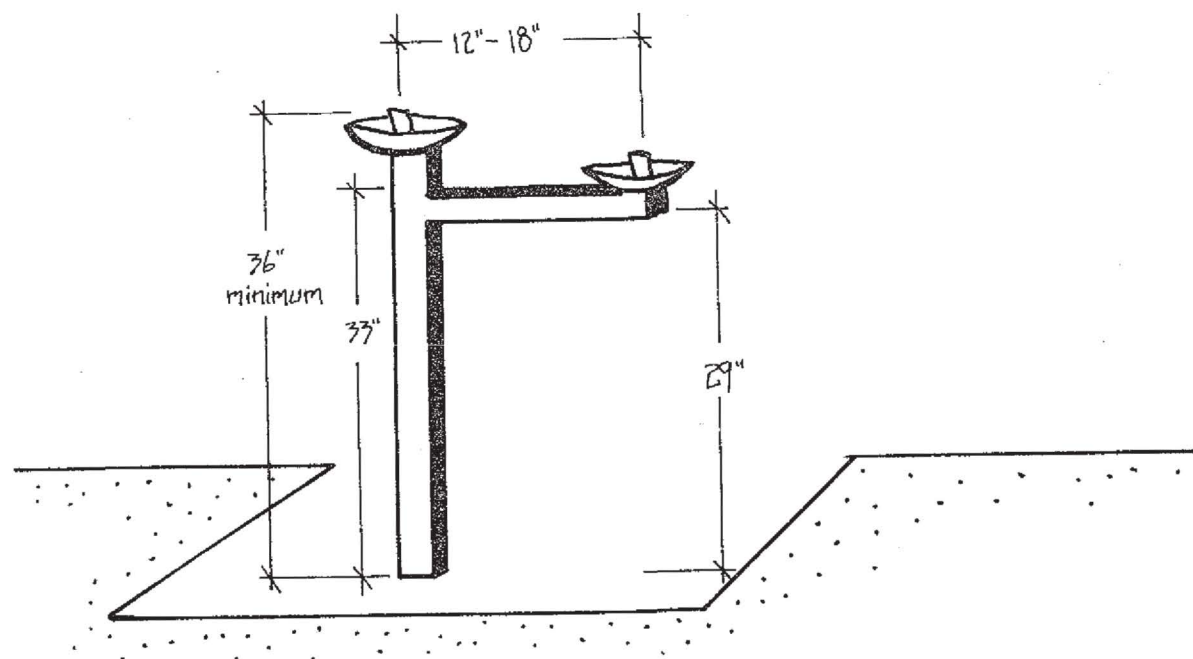
PROPOSED REDESIGN OF DRINKING FOUNTAIN

The present drinking fountain was not designed to be used by a person in a wheel chair, or for that matter, a small child. First, there is no hard surface around it. However, in addition, the base of the fountain is surrounded by a step, making it impossible for a wheel chair to get close enough to use, and the spigot is too high for a person in a wheel chair or even a small child to reach.

There are two alternatives to this problem and each is shown on a following page. A new drinking fountain can be constructed to comply with the recommendations set forth by the U.S. Department of Housing and Urban Development, or the present fountain can be redesigned to meet these same standards. Either alternative will be costly with the key question being which will be the cheapest.



REDESIGNED EXISTING DRINKING FOUNTAIN



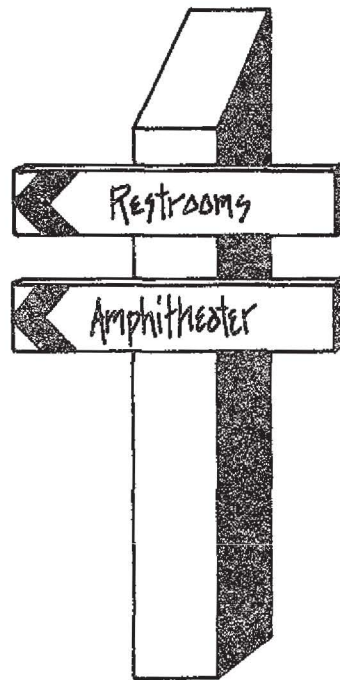
NEW DRINKING FOUNTAIN

SIGNING IN THE CAMPGROUND

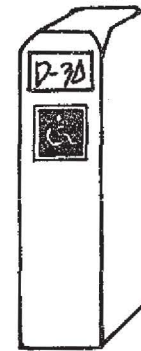
To aid the campground visitor, and to protect the transplanted trees, shrubs, and rotten logs, a system of signing needs to be provided in the campground. Examples of recommended signs and their locations are shown on following pages.

Another type of signing with exciting possibilities is interpretive signing. This would give the project publicity and also serve as an educational tool. The visitor could be told of the importance of rotten wood and then see its practical use.

The rehabilitated area, whether it is the entire loop or a small section, can be viewed from all sides by using the road as the "path". Signs can either be placed close to the ground well off the road, giving pedestrians the best view, or raised with the words printed larger, making the area suitable for viewing from an automobile. Either approach is strongly urged as part of the interpretive program.



DIRECTIONAL MARKER (TO BE USED
AT BEGINNING OF PATHS)



CAMPSITE IDENTIFICATION MARKER

REMOVAL OF BOLLARDS IN THE CAMPGROUND

It is strongly suggested that the creosote bollards be removed from the campground loop. Due to the narrowness of the road and improper placement, they are more of a hazard than a help to many park visitors. In addition, the creosote bollards do not appear as "natural" as rocks.

As an alternative, boulders two feet and over in diameter can be used. They would be placed as specified in the Master Plan, and would work with the other proposed material (vegetation and rotten logs) to channel vehicular and pedestrian traffic. They would not replace the bollards one for one, but would be more irregularly placed.

RECOMMENDATIONS

RECOMMENDATIONS FOR LOOP D AFTER REHABILITATIVE EFFORTS

After the Loop or areas within the loop have been rehabilitated, the section should be closed to campers for at least one, and preferably two, visitor seasons. The vegetation will have a much better time to "take hold" and grow.

In addition, this area will need to be watered every other week during the summer season in order to survive. If weather conditions are hot and dry, it may become necessary to water the plantings more often, say once a week or every ten days.

Finally, as was stated earlier, it is mandatory that a source of firewood be provided. Otherwise, vandalism of existing trees and to the transplanted rotten wood will certainly result.

CONCLUSION

CONCLUSION

Implementation of the plan rests with the staff of the Mount Rainier National Park who contracted for its preparation. Once rehabilitated, it will also be the responsibility of the Park staff to protect Ohanapecosh Campground and maintain it for the numerous visitors.

The result of this study, whether or not it is possible to maintain or reclaim overused campgrounds using this method, will not be known for years. But, unlike many studies, the rehabilitative efforts will give immediate positive results. The transplanted trees, shrubs, and rotten wood will have an instant and favorable aesthetic impact.

It is, of course, our hope that the plan will have results reaching far beyond an exercise in beautification of a single campground. Perhaps, it will foster a trend in campground design, rehabilitation, and new construction that is more nearly "in tune" with nature.