

CHAPTER 82

DESIGN CONSIDERATIONS

In addition to the normal silvicultural and economic considerations which go into sale planning, a number of design elements must also be considered in order to minimize:

- The visual impact of the timber harvest and post-harvest activities.
- The amount of time, effort, and cost involved in meeting aesthetic management objectives.
- The amount of acreage managed for less than its total productive capacity.

VISUAL PENETRATION

It must be remembered that the goal of a visual enhancement area (VEA) is moderation of the impact of forest management activity, not its total concealment. In resource management, a series of trade-offs must be evaluated. All values cannot be maximized simultaneously. The goal of any successful sale design is to accomplish the forest management objective while preventing any unacceptable reduction in other resource values.

Visual penetration -- defined as the length of a viewer's unobstructed line of sight -- depends on a number of factors:

- Timber type -- northern hardwood as opposed to spruce-fir, for example.
- Season of the year -- "leaves-off" vs. "leaves-on".
- Topography -- both hills and valleys.
- Land features -- lakes, road right-of-way clearings, power line clearings, etc.
- Average DBH and stand stock levels

In Figure 82.1, for example, it's very apparent that the effective limits of visual penetration would vary considerably.

Obviously, if the aesthetic management goal is to screen all areas of an activity equally, the width of a visual enhancement area will vary considerably, depending on the specific circumstances in each location, as shown in Figure 82.2. This is an extremely important concept to keep in mind. Visual enhancement areas are generally drawn as a parallel corridor along sensitive areas. This is done to simplify mapping and planning only. It is not representative of the shape of the actual enhancement area on the ground. This is an easy trap to fall into and must be avoided.

Not only is the width of the VEA important, its shape and location also have an impact on its effectiveness.

As shown in Figures 82.3 and 82.4, the line of sight is reduced by fingers and islands of the deferred portion of the sale area, doing away with the need for roadside screening. In pure even-aged, short-lived types, the use of sale shape rather than vegetative screening to limit visual penetration has a number of advantages:

- The entire stand is treated in a more systematic fashion. Separate plans need not be developed for "roadside" and "backland" areas.
- There is less tendency to create small unmanageable units.
- Favorable long-term stand size and shape is more quickly realized. Roadside "strips" are generally a short-term solution at best, especially in pure even-aged types.

VIEWING INTENSITY AND DURATION

Intermingled with the concept of visual penetration, is that of viewing duration and viewing intensity. All parts of a sale area are not viewed equally. The orientation of the traveler's vehicle, for example, creates areas of different viewing duration and intensity as they travel along roads and streams. See Figures 82.5 and 82.6.

In general, the greater the viewing intensity, the shorter the visual penetration should be, as shown in Figure 82.7.

DEGREE OF INTENSITY

The intensity of aesthetic management techniques must vary according to need. Cookbook solutions are not possible (or desirable). Each given situation must be analyzed with respect to:

- Degree of aesthetic sensitivity.
- Silvicultural attributes of the timber type in question:
 - Type of harvest needed -- clearcut vs. selective cut.
 - Length of regeneration period.
 - Need for post-sale work.
- Long-term goals, in terms of both aesthetics and timber management:
 - Is present age distribution acceptable?
 - Is present stand size desirable?
 - Will aesthetic sensitivity increase or decrease in the future?

The silvicultural and aesthetic management aspects of the design must be biologically sound and harmonize. The object is to reduce future aesthetic and silvicultural problems. Short-term, easy solutions often perpetuate existing problems into future rotations. See Figures 82.8 through 82.12.

BOUNDARY LAYOUTS

After the aesthetic management needs of a given area are determined, it becomes the task of the forest manager to design a sale boundary that will meet those goals both effectively and efficiently.

At this time, any favorable stand elements (understories, long-lived species, age diversity, topography, etc.) should be identified and incorporated into the boundary layout. It is critical that this be done in the field on the site in question. Many favorable elements do not show up on aerial photos; fewer still appear on timber type maps. Roadsides should be walked over and detailed notes made on the timber type map. When this data has been collected, boundary layout can begin.

Two general approaches to boundary establishment are suggested, depending on the type of management anticipated in the visual enhancement area.

A. Partial Cuts

In these situations, the visual objectives will be met by retention of a portion of the existing stand. The object is to accurately locate that exact area in the critical viewing zone and delineate it for "special treatment". This approach is generally used in linear situations (roadsides, lake and stream buffers, etc.).

To implement this method, two people work together. One person marks in the line, while the other paces him or her with the vehicle. The marker moves into the forest until he/she achieves the desired level of visual screening between marker and vehicle, moving further back in sparse timber and open areas, and moving closer when encountering dense timber and favorable topography.

In cases where a high degree of year-round screening is needed and the boundary is being established in the summer, a second marker may be used. The second marker moves back further in the stand, guiding the first marker, to allow for the decreased screening value after leaf fall. This technique is also useful if substantial removal of selected trees is planned within the strip as part of the sale design.

This approach is also useful for defining areas needing special slash disposal restrictions, and special cutting or skidding specifications.

B. Clearcuts

A clearcut is the removal in one operation of essentially all the trees in a stand. Even-aged regeneration methods that result in clearcuts are: clearcut, coppice, seed tree, overstory removal, and shelterwood (final cut). Reserve trees and islands can be retained to improved aesthetic conditions. A number of factors contribute to decisions on the size and configuration of clearcuts (e.g. access, stand size and shape, wildlife considerations, etc.). As a general guideline for aesthetics, even-aged clearcut patches should not average in excess of 120 acres, unless warranted for forest health emergencies, natural catastrophes, or conservation objectives. This should be considered an annual average for a specific property. Also, regeneration in clearcut areas should consist of trees at least 3 years old or 5 feet tall at the desired level of stocking before adjacent areas are clearcut, except when warranted to achieve conservation objectives.

In these situations, since there is no residual timber, sale shape is the primary method of meeting visual objectives. This approach is applicable on both a linear and area basis. Visual enhancement areas required in these situations are too complex to "ad lib" directly in the field. Instead, they must be carefully laid out on an aerial photograph, after all favorable elements have been identified in a field exam.

A square chainage grid can then be laid over the photo to assist in field installation, as shown in Figure 82.13. The field work is best done in teams, with the lead person establishing reference points for the following marker. The lead person follows cardinal directions on the grid and stops at points where it is intersected by the planned sale boundary. The leader then signals the marker who paints toward the lead person, deviating off course as the planned boundary dictates. Larger, more generally undulating boundaries can be traversed in short segments. In any case, some sort of control is necessary for accurate line location as well as acreage determination for volume calculations.

Sale shape and scale are largely determined by:

- Existing form and scale found in timber types naturally occurring near the sale area.
- The size and shape of the stand being treated.
- Naturally occurring favorable stand elements.

See Figures 82.14 and 82.15 for examples of sale shape and scale determinations.

The use of paint in marking sale boundaries in sensitive areas must be done carefully. On the one hand, it is important that loggers be able to follow complicated sale boundaries without difficulty. On the other hand, paint marks should not be visible after the cutting is finished.

Several alternatives are possible:

- Use green paint.

- Mark on the back sides of trees (may be hard to follow on complicated boundaries).
- Mark trees normally (coming and going) plus a stump mark. Line trees are then harvested.
- Mark trees with flagging plus a painted stump mark. Flagging is then removed after cutting is completed.

ROAD LAYOUT

Road layout should meet aesthetic needs as well as timber management requirements.

As far as possible, road systems should:

- Reduce the need for an excessive number of exits onto sensitive roadways.
- Facilitate later management of deferred harvest zones.
- Be compatible with post-sale treatment plans (firebreak needs, shearing boundaries, etc.).

Road entrances should be laid out so as to provide a straight-on exit for logging trucks, while still reducing visual penetration as much as possible, as shown in Figure 82.16.

Entrances should be cleaned of debris, stumps, and logging slash concurrent with construction.

FIRE MANAGEMENT CONSIDERATIONS

Fire management, both with respect to slash disposal and wildfire control, is an important element of aesthetic management. This is especially true in coniferous timber types.

Prescribed fire can be a very effective method of post-sale slash reduction. Unfortunately, many of the measures taken to reduce the visual impact of a harvest may make burning more difficult. Irregular shapes, scattered residual trees or clumps of trees in the sale area, and adjacent uncut timber will complicate matters. Advance planning is essential.

- Logging road locations should be designated so as to maximize their value as fire breaks. Water points should be developed in high hazard areas. Timber sale contract provisions should ensure that slash is not allowed within the tree line of adjacent stands.
- Slash pile size should be controlled. Large piles are difficult to burn safely and completely.
- Consideration should be given to requiring windrowing of tops, either by the operator, or by post-sale brush raking. Broadcast slash often requires dead vegetation to carry the fire. This means spring or fall burning, when fire control equipment may be tied up. Windrows can be burned in midsummer, when equipment is usually available. The green ground vegetation also reduces control efforts and manpower needs.
- Scattered residual conifers should be avoided if possible. If not, slash should be pulled away from the base of the trees and the lower branches pruned off to avoid scorching or crowning out.
- Slash depths in excess of two feet may make direct attack impossible. Extra pre-burn slash control work may be necessary along control lines.

Visual enhancement areas, created to minimize visual impact, will also affect wildfire control efforts. This impact may be positive or negative, depending on the location of the VEA and the timber type involved.

In heavy conifer areas, a VEA immediately adjacent to a road may act as a "wick" to move the fire up off the ground, into the crowns, and over the heads of fire control personnel. The value of a road as a fire break may be completely negated by poor planning. Location of VEA's in conifer areas should be thoroughly reviewed by the fire management staff.

In hardwood areas, a visual enhancement area may have the opposite effect. By providing slash-free "corridors" for fire line construction, they may aid control efforts considerably. Again, fire management personnel should be consulted in sale design so as to ensure maximum value in wildfire control efforts.

The retention of hardwood clumps in areas being converted to conifers should be considered in light of fire control needs as well as the reduction of visual impact. Such hardwood areas can often be laid out so as to form a more or less permanent fuel break. These breaks can be used to great advantage in fire control efforts. They also have a considerable value in terms of visual and wildlife resources.

Figure 82.1 Impact of timber type on visual penetration.

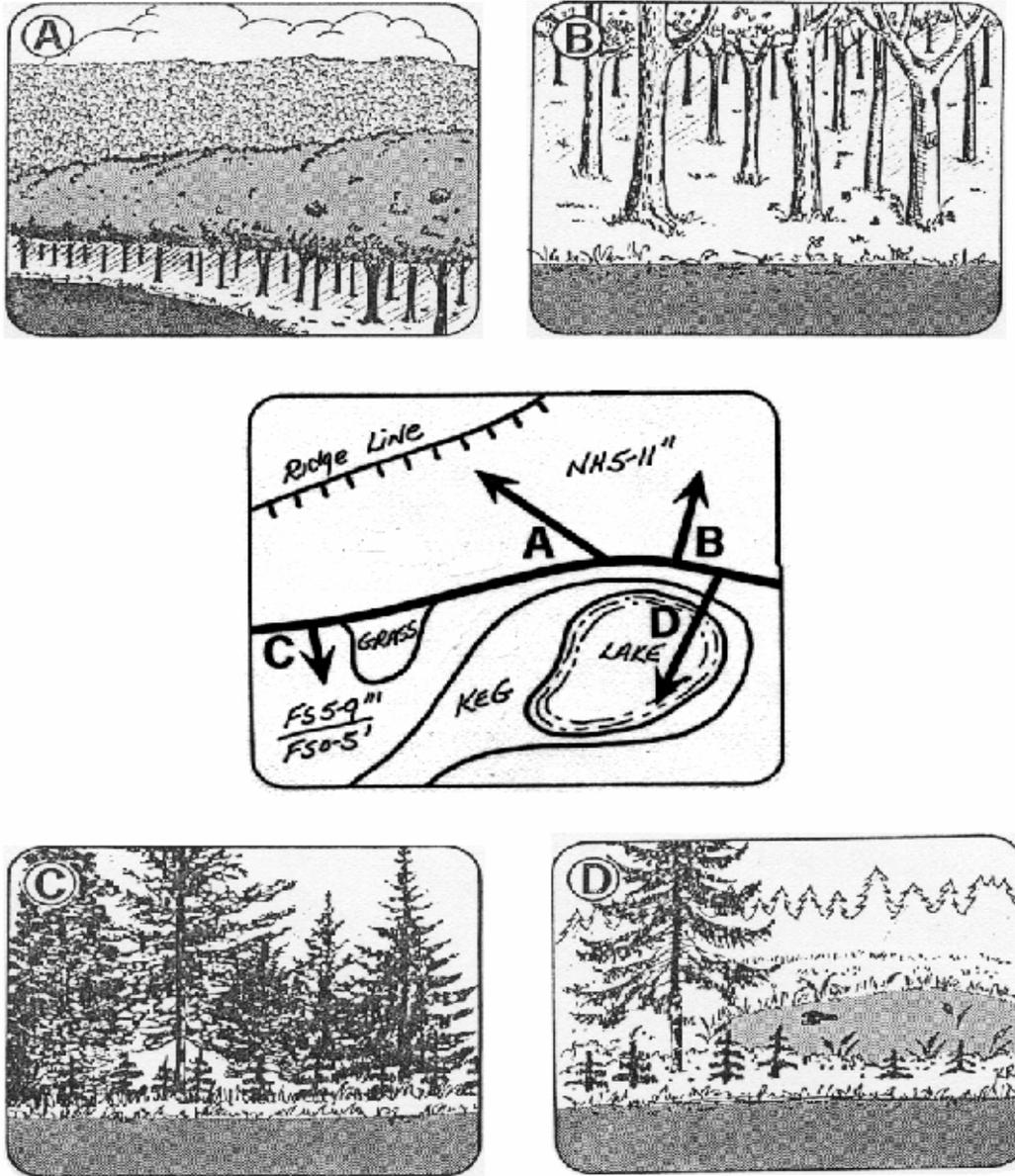
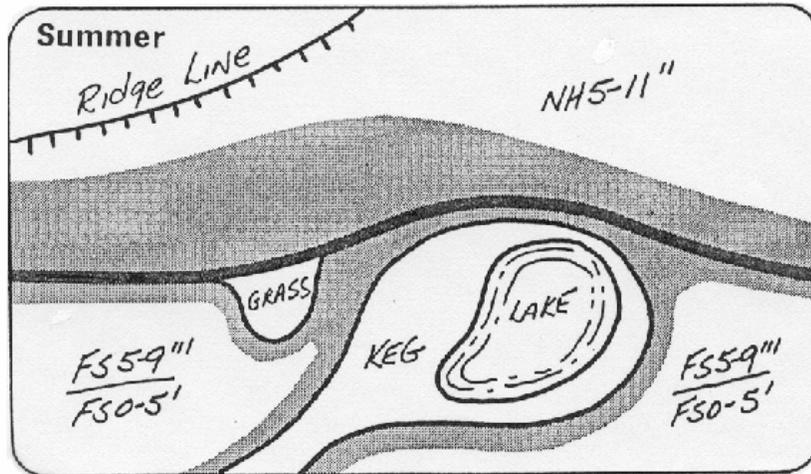
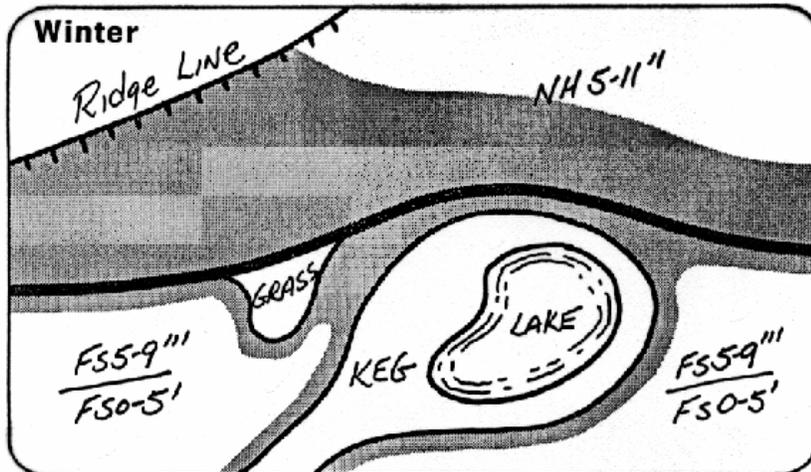


Figure 82.2 Allowing for variations in visual penetration.



Areas of equal visual penetration. Note the influence of timber type, topography, land features, and season. It is essential that the forest manager include these considerations in the sale design in order to minimize costs and maximize effectiveness.



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Figure 82.3 Visual penetration -- a roadside visual enhancement area designed to reduce visual penetration by sale shape rather than by vegetative screening.

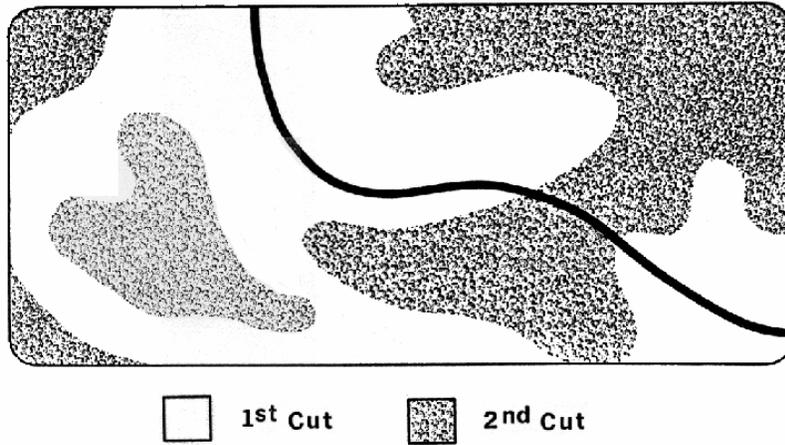
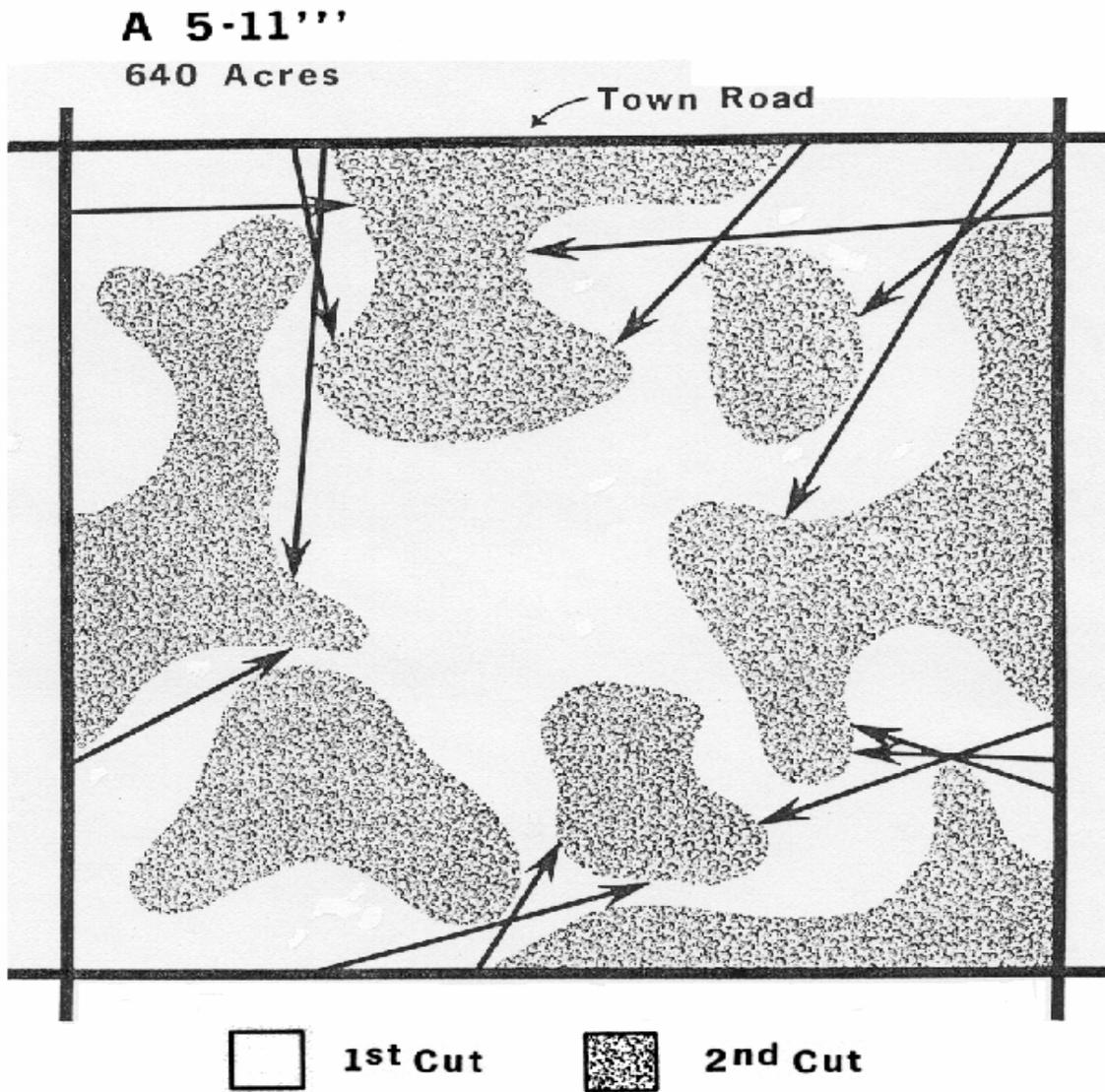
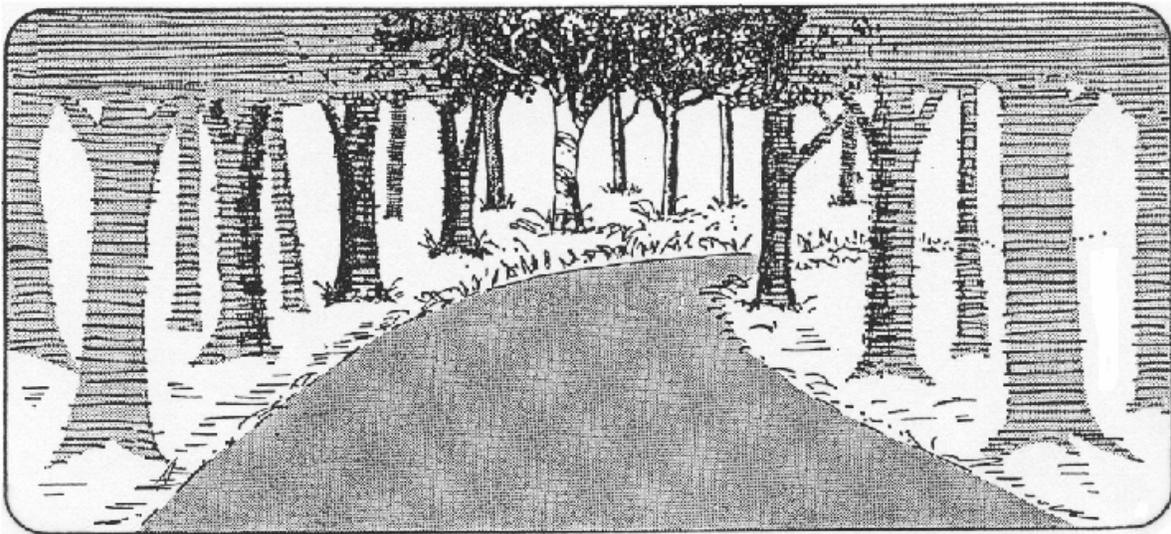


Figure 82.4 Visual penetration and shape of cutting units.

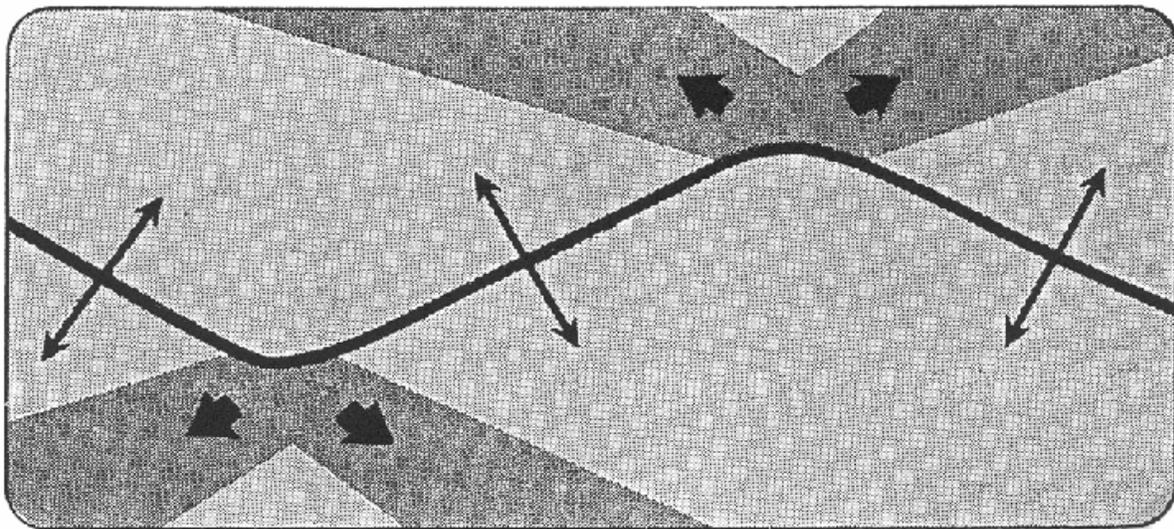


Visual penetration (line of site) has been reduced by the shape of the cutting units. Note that the longest sight distances occur for the shortest duration.

Figure 82.5 Viewing intensity and duration.



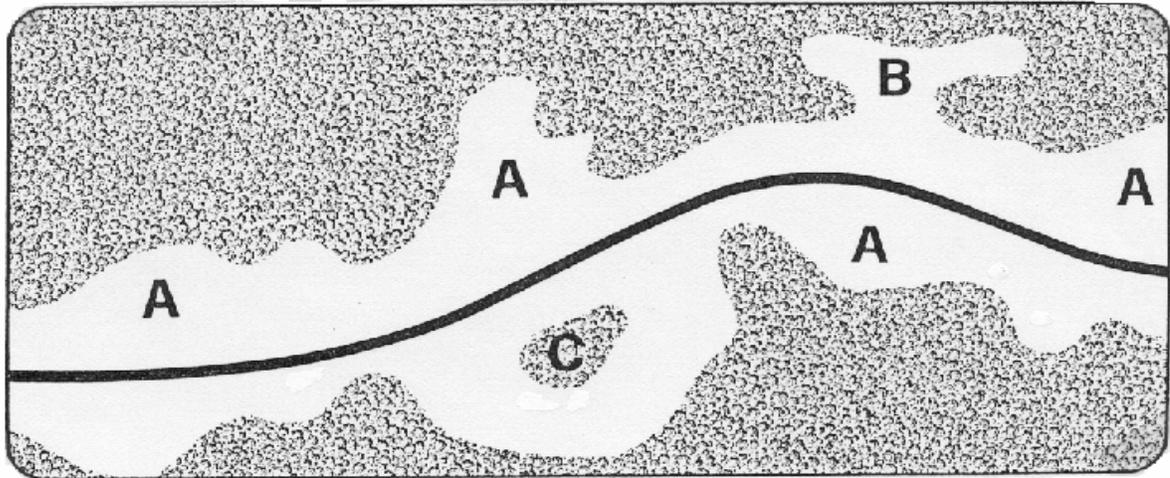
As a vehicle travels down a road, the driver tends to view objects off the end of a curve longer, and with greater intensity, than objects directly to the side.



 Areas of high visual intensity

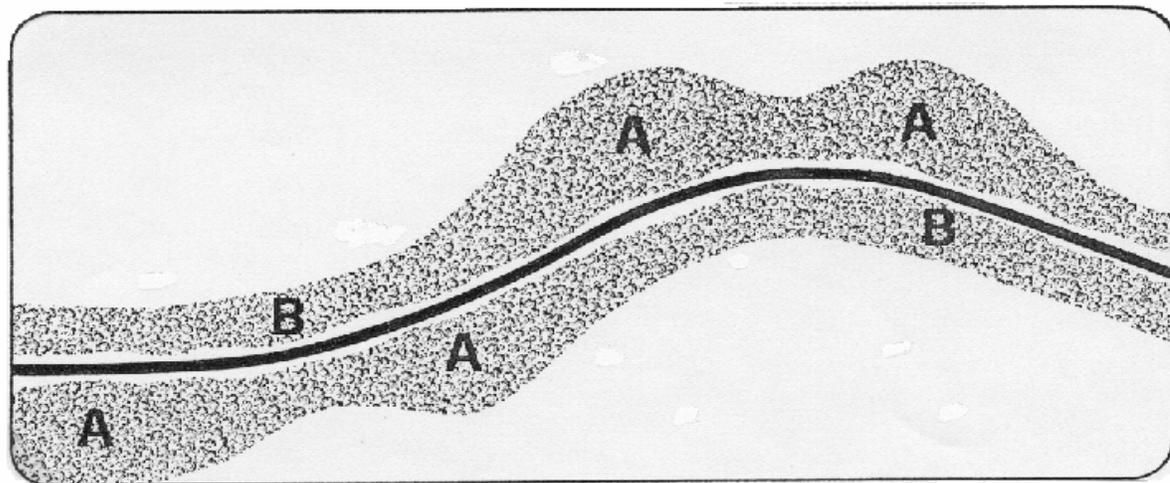
 Areas of lower visual intensity

Figure 82.6a Sale design -- cut strips.



In laying out a scalloped cutting boundary, the widest portions are laid out on the straighter sections of the road, (A), or the dead spots on the curves, (B). An island was left at (C) to screen a wider area on a curve.

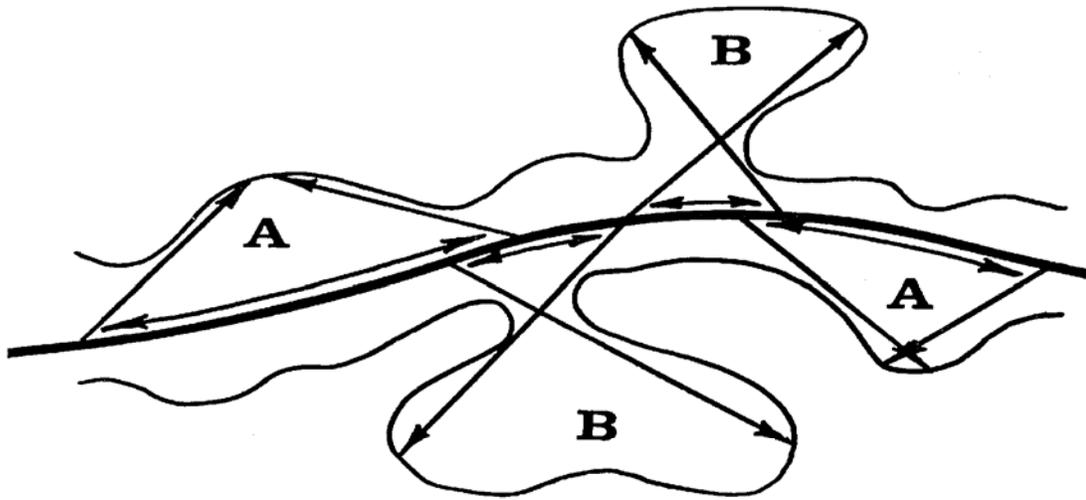
Figure 82.6b Sale design -- leave strips.



When leaving uncut strips along roads, additional width is needed in areas receiving the longest, most direct viewing, (A), with less width needed in other areas, (B), to do the same job.

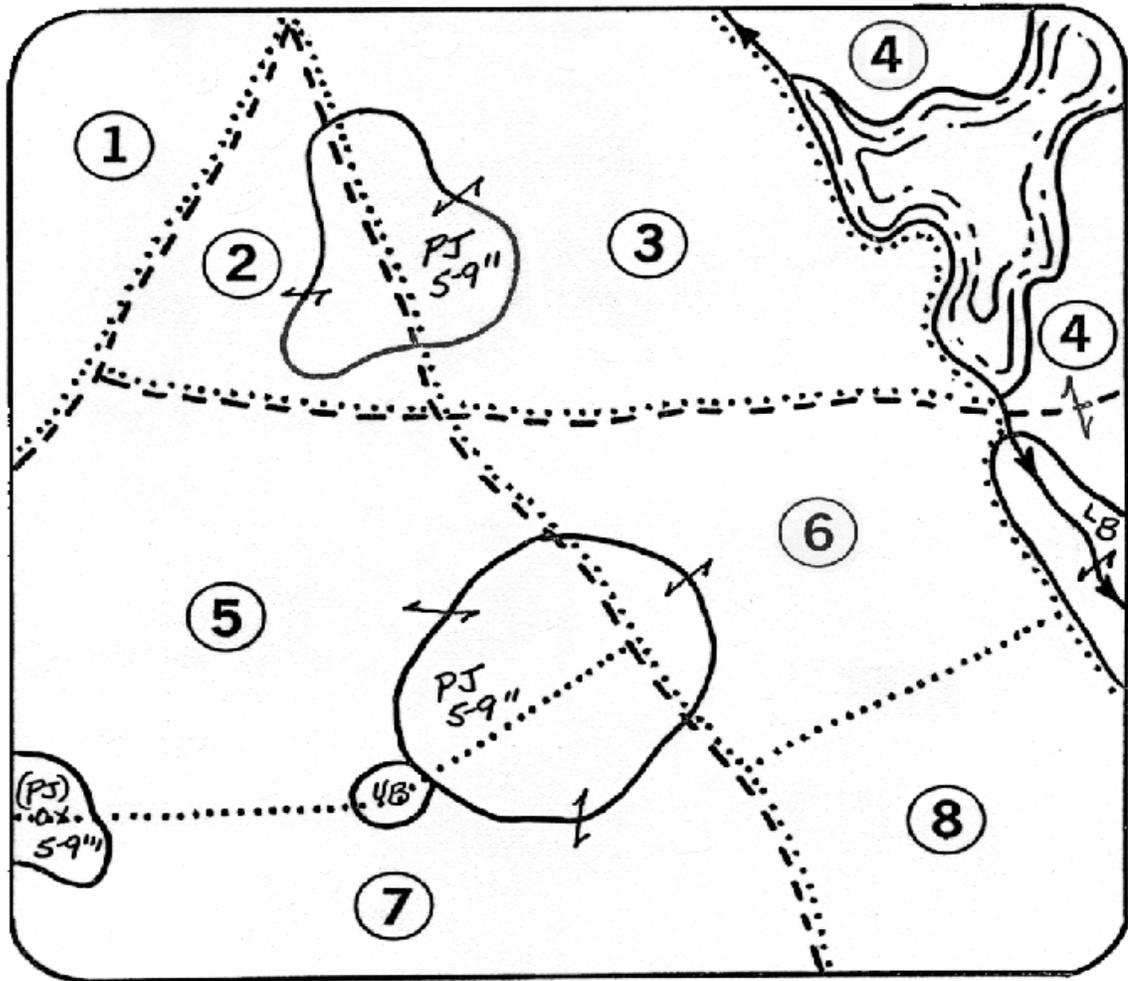
In laying out a scalloped cutting boundary, the widest portions are laid out on the straighter sections of the road, (A), or the dead spots on the curves, (B). An island was left at (C) to screen a wider area on a curve.

Figure 82.7 Relationship between viewing intensity and visual penetration.



In areas "A" the visual penetration is less, but the viewing duration is longer.
In areas "B" the visual penetration is greater, but the viewing duration is less.
The visual impact of both areas would be approximately the same.

Figure 82.8 Level of intensity -- low level aesthetic sensitivity.



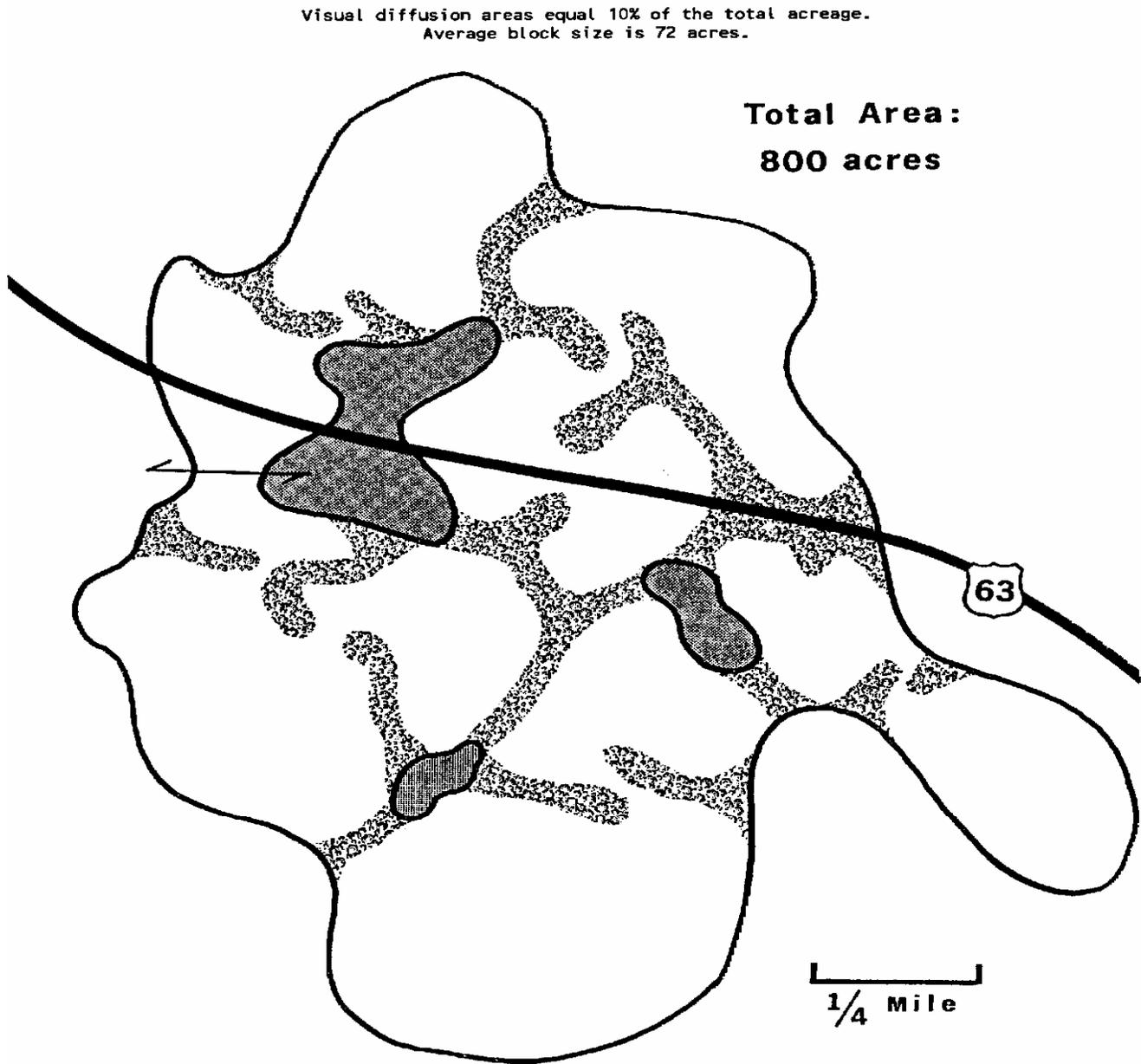
Low level of aesthetic sensitivity:

Fewer blocks.

Larger blocks.

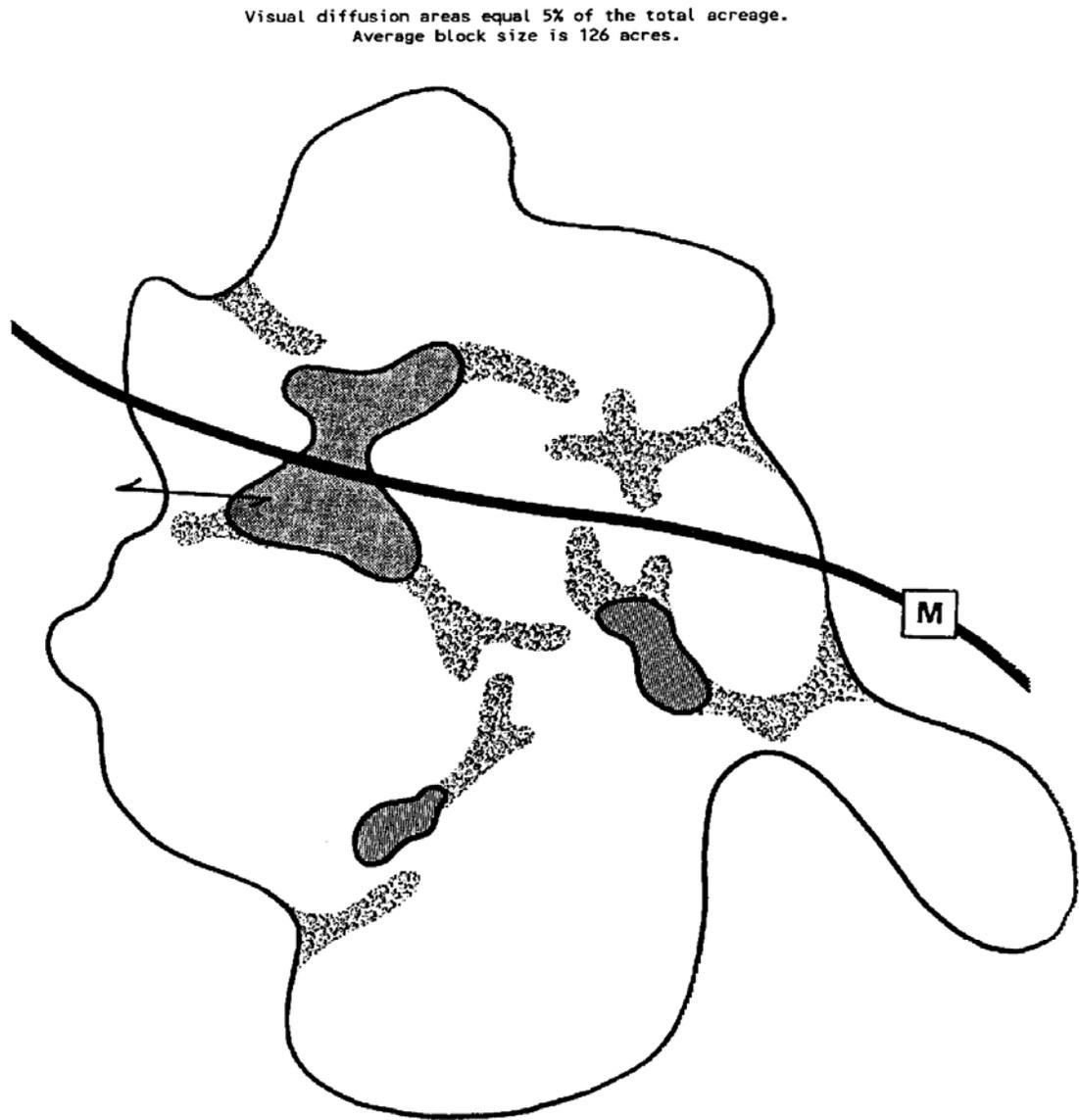
Straighter boundaries.

Figure 82.10 Level of intensity -- example of smaller block size.



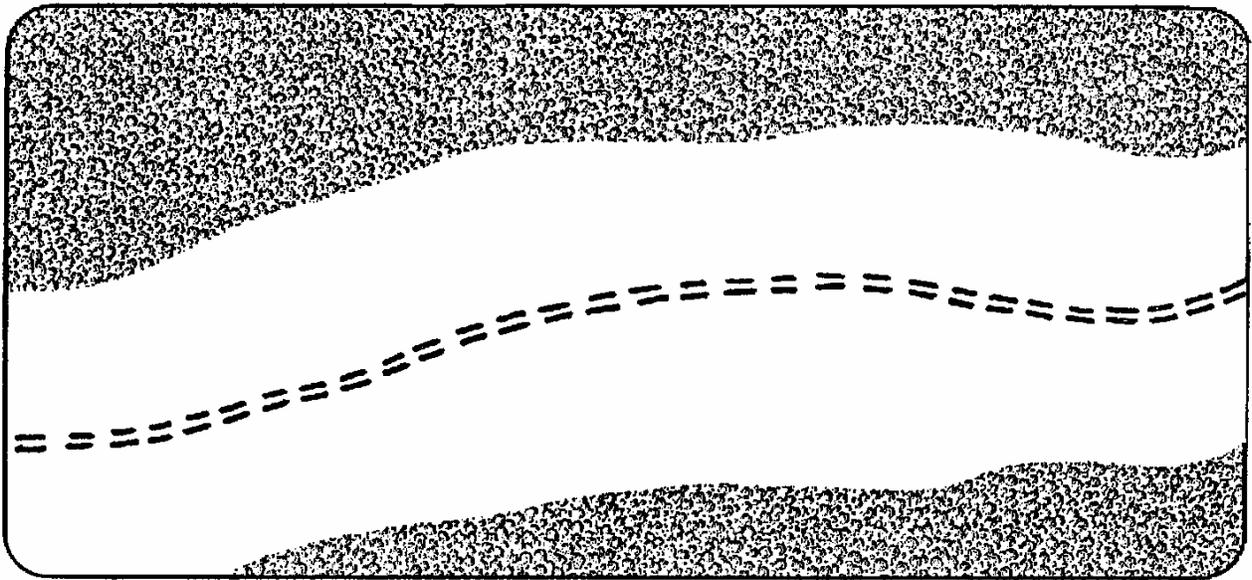
Depending on the need, the acreage devoted to a visual diffusion area can be varied.

Figure 82.11 Level of intensity -- example of larger block size.

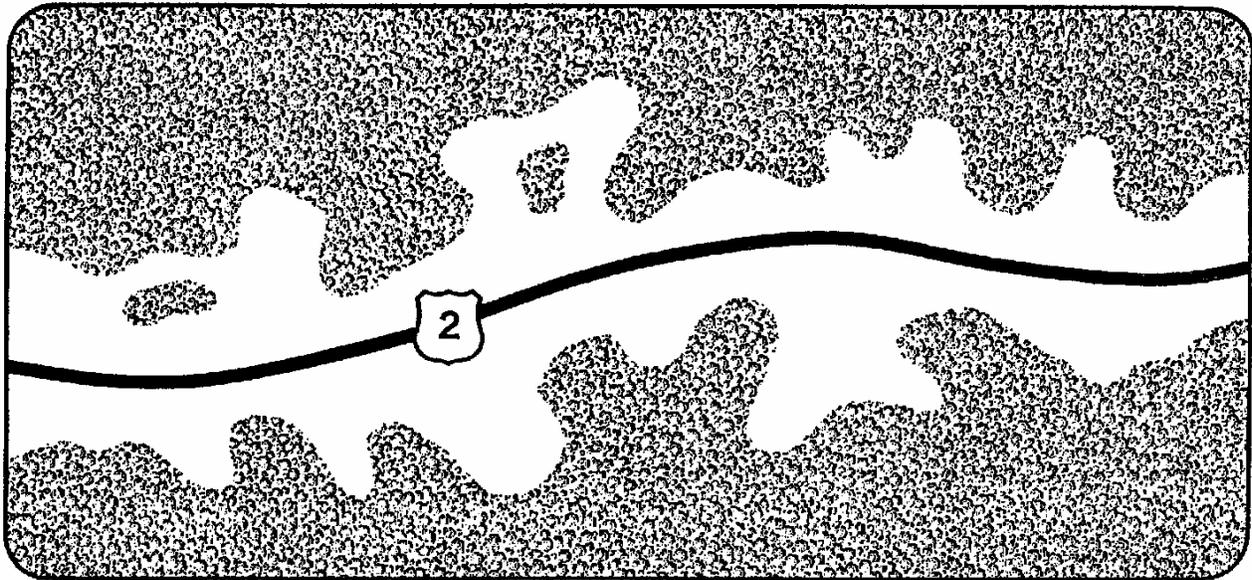


Less aesthetic sensitivity -- fewer corridors.

Figure 82.12 Pre-cut visual enhancement areas -- immature timber.



Lower aesthetic sensitivity.
Shorter regeneration period.
Less intensive.



Higher aesthetic sensitivity.
Longer regeneration period.
More intensive.

Figure 82.13 Boundary location techniques.

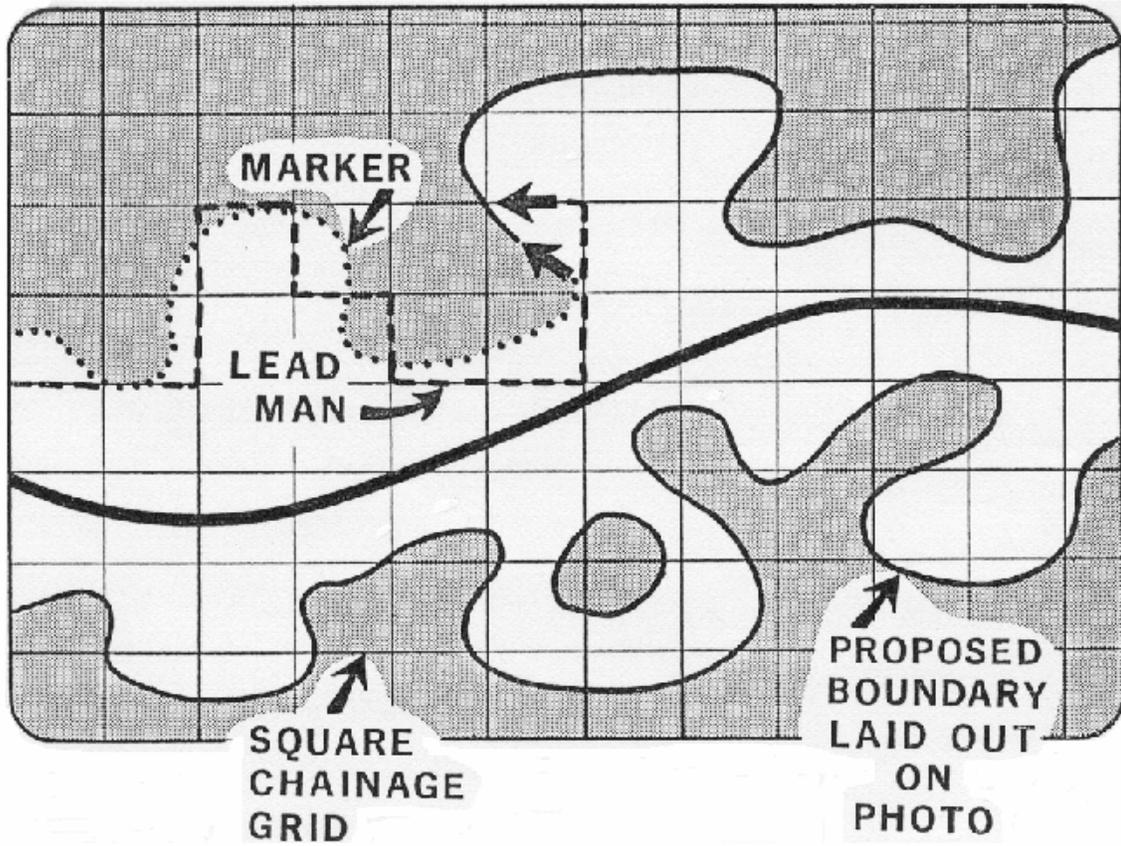
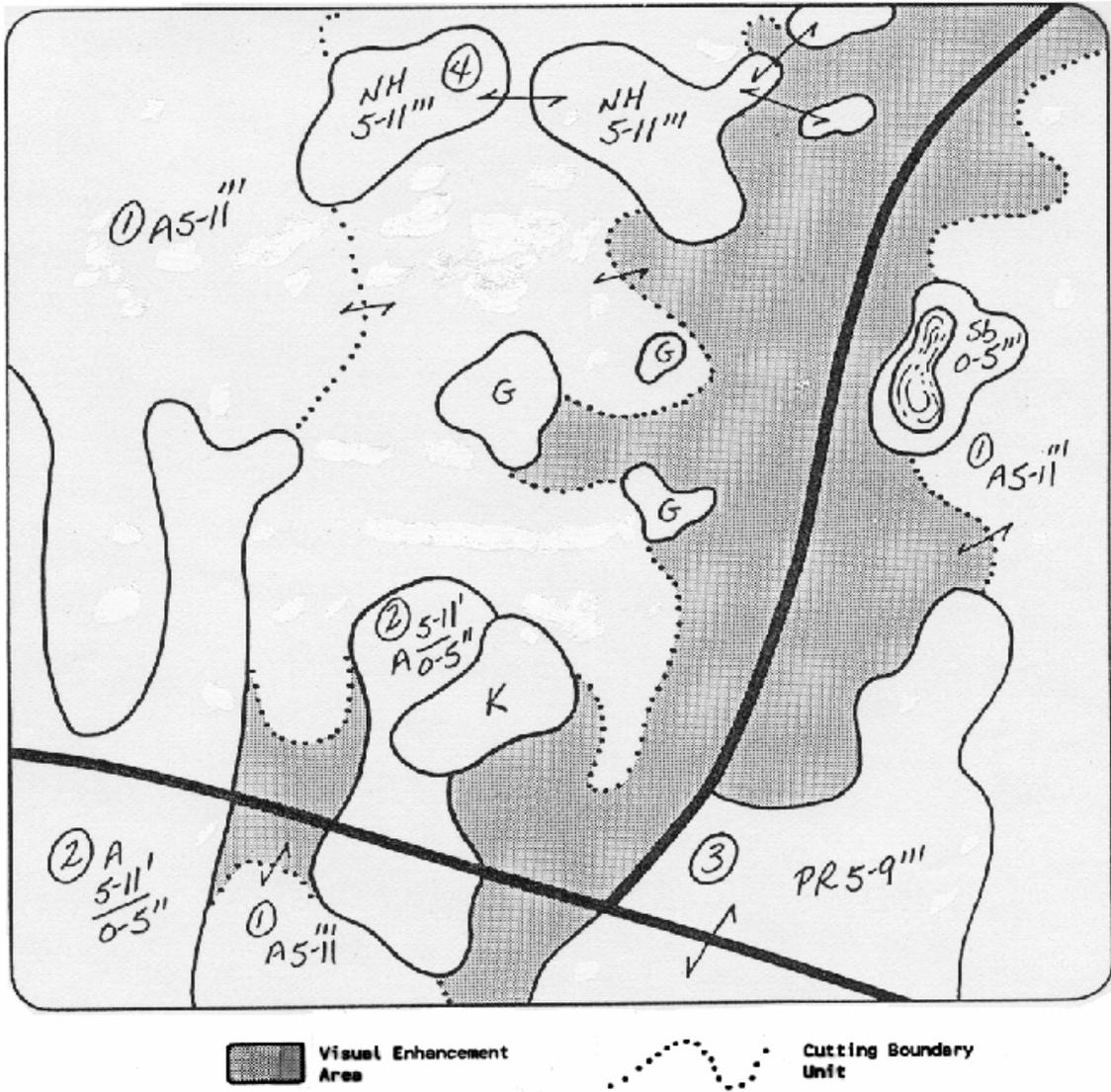
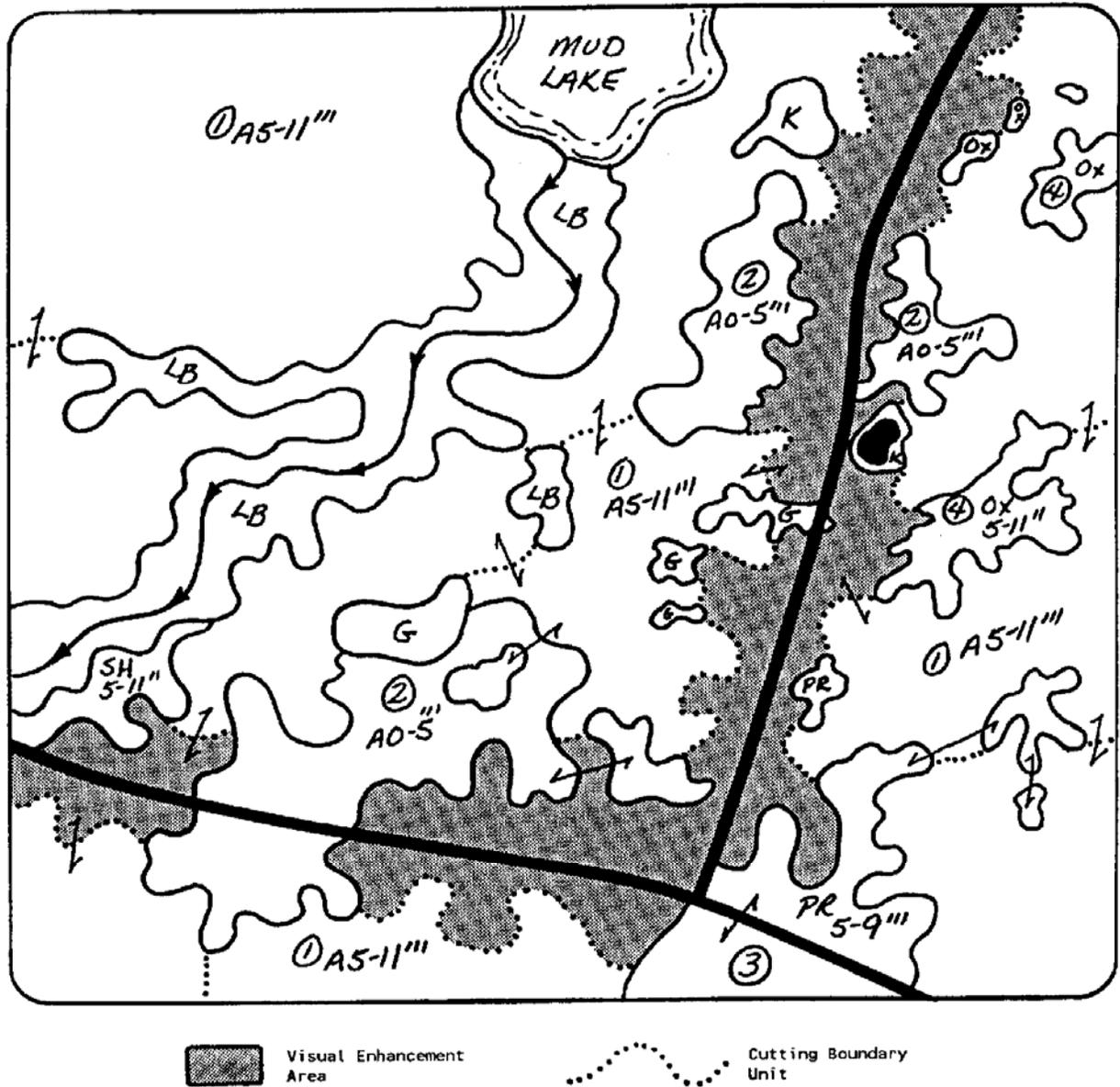


Figure 82.14a Determination of sale shape and scale.



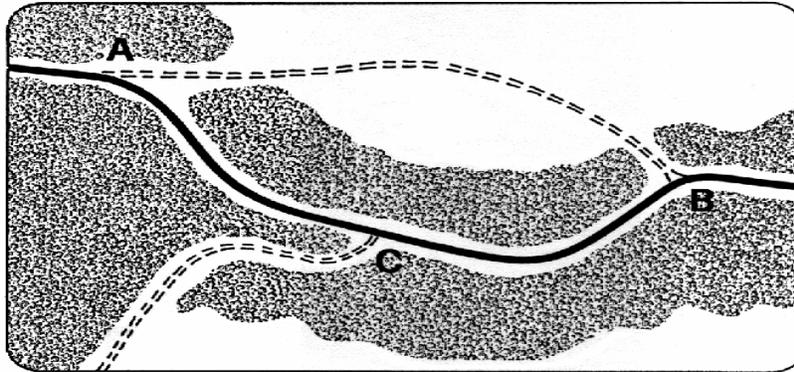
In this example, form and scale were derived from the general shape and scale of stands 2, 3, and 4. Long-lived stands, 3 and 4, were incorporated into the sale design. Where possible, the keg, grass, and swamp types, as well as sapling stand 2, were incorporated into the sale design as well. The boundary between these stands and stand 1 are naturally "feathered" and present a much more natural appearance.

Figure 82.14b Determination of sale shape and scale.



This figure illustrates a situation similar to that in Figure 82.14a, but with a different general form and scale. Each visual enhancement area must be designed to harmonize with specific local circumstances.

Figure 82.15 Logging road considerations.



The logging road entrances at "A" and "B" permit visual penetration directly into the sale area. They also present a safety hazard by joining the main road on curves. The road entrance at "C" restricts the line of sight yet meets the main road at a 90-degree angle in a safe area.