Delaware & Raritan Canal State Park Visual Impact Review Area Study

Delaware & Raritan
Canal Commission

New Jersey
Department of
Environmental Protection

Rogers & Golden
Philadelphia
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Prepared for the Delaware & Raritan Canal Commission
New Jersey Department of Environmental Protection

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DELAWARE & RARITAN CANAL
VISUAL IMPACT REVIEW AREA STUDY

Under its legislative mandate, the Delaware and Raritan Canal Commission is responsible for preserving the integrity of the nearly 60 mile long D & R Canal State Park girdling central New Jersey. This responsibility includes the review of new development outside the park which may affect it. Specifically, the Commission has been given authority to approve or disapprove any development influencing surface water runoff, flooding potential, esthetic surroundings, or the structural integrity of the canal and park. As a part of the review process, the Commission intends to examine the visual influence of developments seen from the park. This study and mapping is done in furtherance of that intention.

To facilitate planning and management, the Delaware and Raritan Canal Park has been divided into 28 segments by the Canal Commission. The segments are of varying length, though each tends to display an internally homogeneous character. Some segments are special nodes; others are lengthly stretches of canal which have been divided for convenience at canal locks. These 28 segments are mapped on 11 sheets, which comprise the Visual Review Area map series.

The 1" = 1,000' scale base for the maps is drafted from photo enlarged U.S. Geological Survey 7½-minute quadrangle sheets. As shown on the Review Area maps and in the map legend, the visual data displayed include;

The Canal Park property boundary
The ½-mile visual review limit on each side of the Canal Park.
The primary and secondary review areas.
The location of view modifers:
- vegetation
- landforms
- clusters of structures

The context of the Canal Park environs:
- urban
- suburban
- rural

CANAL PARK PROPERTY BOUNDARY

The mapped line showing the extent of Canal Park property is taken from other Commission maps. The property includes the lands which reverted to the State of New Jersey when the canal ceased commercial operations, plus recent acquisitions. In most instances the state land is a rather narrow band with occassional wide areas; the wider areas occur especially in the Millstone River vicinity, where Green Acre funding (open space bonds) supported several land purchases in recent years.

THE ½-MILE VISUAL LIMIT

The area of highest visibility is within about ½ mile of a viewer. To substantiate this it is useful to examine some viewer-object relationships.

Objects in the landscape can often be seen from great distances; but with increasing distance from a viewer, the status of an object changes. It shifts from being a foreground object, through a middleground condition, into being an element in the background. The significance or distinctiveness of the object in the overall landscape is a function of several factors; its distance away, the degree of screening, size and color relationships to its surroundings, to mention a few.

In formulating development review criteria, it can be argued that the Commission should deal with as many of these aspects of the seen environment as possible. But, this is an ideal goal, and is one which may not have particular significance to the Commission's work, considering their administrative needs. Given the complexity of cultural and natural environments through which the Canal Park runs, the diverse range of potential development, and the fact that visual impact review is but one of a bundle of Commission repsonsibilities, it would be an impossibly enormous and not especially fruitful task to attempt to deal with a large array of visual factors. Instead, the Commission has elected to concentrate on the land which is potentially highly visible from the Canal Park; and to establish goals relating to visual impacts, and criteria for assessing the acceptability of an impact.

Several studies (Litton, 1968; Forest Service, 1973; EDAW, 1975) have drawn on work which divides the landscape into the three planes or grounds mentioned: foreground, middleground, and background. The definitions of these are necessarily imprecise, as are the distance at which they become applicable terms; but the definitions and distances are nonetheless reasonable and useful in establishing a development review scheme.

The general definitions of the three grounds, presented nearly a decade ago by R. Burton Litton, still serve us:

Foreground

Foreground has a simplicity in designation not to be found in either middle or background: the simplicity of the observer's presence. The observer is in it. The amount of detail which can be seen is a function of time and speed, but maximum perception of detail can only occur at close range. Surface patterns of bark, juxtaposition of tree trunks, the nature of the understory vegetation, the roadway and its edges are examples of what might be seen here. The observer is able to relate himself to the size of the parts, such as an individual tree, and he begins to sense a scale relationship between himself and the landscape. Aerial perspective is absent or insignificant in foreground, and the intensity and values of color are to be seen in maximum contrast, contributing to the sense of presence. Another contribution to sense of presence is that wind motion in trees or on grass can be seen in this close-in area but seldom beyond. Other sensed experiences are also a part of this intimacy: the sounds, smells, and tactile experiences that are most acute here.

This intimacy gives rise to two possible disadvantages. The foreground may mask what lies beyond. And attention to detail may detract from the landscape

matrix of which the foreground is but the frontal part. In either case, the context of the larger landscape may be lost, or at least momentarily so. Yet these possibilities can also be considered an advantage. Involvement with foreground provides one means of developing a sequential visual experience with travel over time.

Middleground

Middleground, or the intermediately distant landscape, is most critical. Here the linkage between parts of the landscape may be seen. Within the foreground we see a single hill, but middleground distance offers a chance to see that a series of hills are joined together into a range, or that a drainage pattern becomes apparent through its support of a particular plant community. The emergence of shapes and patterns, and the visual simplification of vegetative surfaces into textures should take place here. It is in this range that the joining of parts can be clearly seen. Consequently the middleground aspect can often best show whether man-made changes rest easily or uneasily on the landscape.

Aerial perspective in the middleground distance, softens — or "grays down" — color contrasts. The simplification resulting from this softening effect of aerial perspective, makes the middleground a visual foil for the greater complexity and detail of foreground.

Middleground skyline silhouttes (and the middleground per se) become an interesting combination of detail and generalization. Wind motion along the middle distant skyline can be seen, but elsewhere at this range it disappears. Tree species often can be distinguished by their form against the sky.

As a summary, an analogy to archeological exploration might be drawn concerning middleground distances. Aerial observation from a distance has revealed patterns of historic occupation, such as Roman roads in England, which could not be seen on the ground even though detailed evidence indicated their existence. So observation at middle distance can reveal landscape units or articulation between units which cannot be understood at close hand.

Background

Simplification is background's distinction. The distant landscape or the expansive view reduces form to simple outline shape and removes any (or most) sense of surface texture or detail; the open sky adds an ethereal quality. This simplification may make either foreground or middleground stand out more clearly.

Aerial perspective, which flattens and minimizes color contrast, is the key explanation of background simplification. As distinctions between color hues diminish in the background, they tend to be replaced with values of blue or gray. Only gross patterns stand out: dendritic drainage defiles, the margins of forest, land masses in juxtaposition.

Skylines or ridge lines against other land surfaces are the strongest visual elements of the background. This repetition of the smaller linkages of the middleground again supports the extending, expanding nature of distant landscape.

Finally, a dilemma should be mentioned. We must recognize that as observers travel, the background may become middleground or foreground. The concept of grounds is a static one and the observer is mobile. Nevertheless the mapping of distance effects as grounds is an obvious, and simple, way to provide planners and designers the information they need for application to specific situations. They can see where modification of the landscape may lead to incompatible relationship of forms or to undesirable artificiality. And they can see where changes may enhance the natural landscape — by opening new vistas or by revealing details that aid comprehension of the local ecology, geology, economy, or history.

(Litton, 1968 pp

The character of these three ground conditions are summarized:

	Foreground	Middleground	Background
Visual Characteristics	• Presence — the observer is in it. • Maximum discernment of detail — in proportion to time and speed. • Scale — observer can feel a size relationship with the elements. • Discernment of color — intensity and value seen in maximum contrasts. • Discernment of other sensory experiences — sound, smell, and touch. • Aerial perspective absent.	• Linkage between foreground and background parts of the landscape. • Emergence of overall shapes and patterns. • Visual simplification of structures and vegetative surfaces into textures. • Presence of aerial perspective — softens color contrasts. • Discernment of relation between landscape units.	• Simplification — outline shapes, little texture or detail apparent, objects viewed mostly as patterns of light and dark. • Strong discernment of aerial perspective — reduces color distinction, replaces them with values of blue and gray. • Discernment of entire landscape units — drainage patterns, vegetative patterns, landforms. • Individual visual impacts least apparent.

(EDAW, 1975)

The distances-from-viewer which define the limits of the three grounds are (Forest Service, 1973):

Foreground: 0 to ¼-½ mile
Middleground: ¼-½ to 3-5 miles
Background: 3-5 miles +

A second consideration when defining view distances and analyzing visual impact is the position of the viewer relative to the seen landscape. Three positions are possible: superior, wherein the viewer is above much of the landscape, looking out and down; normal, wherein the viwer is at the same level as the landscape; or inferior, wherein the viewer is below much of the landscape, looking up. Because of its low topographic position, following natural drainage and low ground, the canal (and hence the Canal Park user) is typically in a normal or inferior view position. In the Canal Park area, this generally precludes the long, panoramic visual experience, except where low ridges can be seen on the horizon or the canal embankment is significantly higher than the surrounding land.

This leaves us with two circumstances applicable to most views from the park; foreground and middleground, with an outside view limit of about 3 to 5 miles.

To establish a reasonable visual review zone limit, a team went into the field after studying topographic maps and air photos of the canal region. They had two tasks: document distances over which an object is highly visible, and determine the effectiveness of winter vegetation along the canal corridor in shielding visual impacts. Photos 1 through 4, of some existing structures in the vicinity of the Canal Park demonstrate the distance-from-viewer relationship.

In Photo 1, the farm silo across a field near the Canal is 1,000 meters (3,300 feet) distant. The viewer is in a normal view position, and few view modifiers intersect the line of sight.

In Photo 2, the house in the center is just 550 meters (1,800 feet) away. The influence of oldfield growth and scattered hedgerow vegetation on view length can be seen.

Photo 3 shows a bed sheet viewed from 350 meters (1,150 feet). Just beyond, in the woods, is a structure partially obscured by the vegetation.

A church in Photo 4, seen from 95 meters (310 feet), would normally be highly visible if there were no dense vegetation in the line of sight.

In establishing a ½-mile limit to the visual impact review area, we are drawing on the work cited (Litton, 1968; Forest Service, 1973; EDAW, 1975) and on the experience of the field group. While even distant objects are visible (as in Photo 1) they are not highly influential on the viewer. The viewer can clearly discern that the structure is there, but the intervening distance precludes observation of details about the structure. With the exception of actually screening of the structure, most design and siting considerations such as location of service areas, external storage, or building orientation are not particularly important beyond this distance. With shorter distances (as to the sheet in Photo 3), important visual influences are wielded by objects. By reducing the level of visual unacceptability through regulation of such things are surface materials, colors, and service area locations, substantial visual integrity can be maintained in the Canal Park.

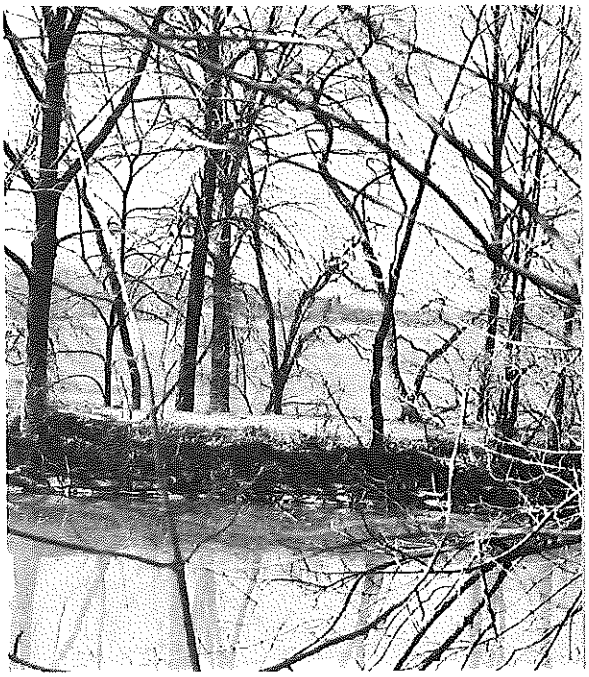
PRIMARY AND SECONDARY REVIEW AREAS

Within ½ mile of the Canal Park property, land areas visible or likely to be visible to Canal Park users are designated as being within the Primary review area. Simply, this land area or any development in this area is liable to view from the park. The extent of the area is defined by the combined mapping of visual control elements: vegetation, landforms, and existing structure clusters. The primary review area is that land not precluded by any of the control elements from visual access from within the park.

The secondary review area, by contrast, is the area not currently visible to park users yet falling within the ½ mile limit. Development within this secondary area is assumed to also not be visible. Essentially, these areas are blind spots to the park user. The protection from view results from screening by the aforementioned view modifiers, viz., vegetation, landforms, and/or existing clusters of structures. (The mapping was based on the assumptions that a three story building adquately represented new development and that the element currently preventing visual access is not removed or modified.)

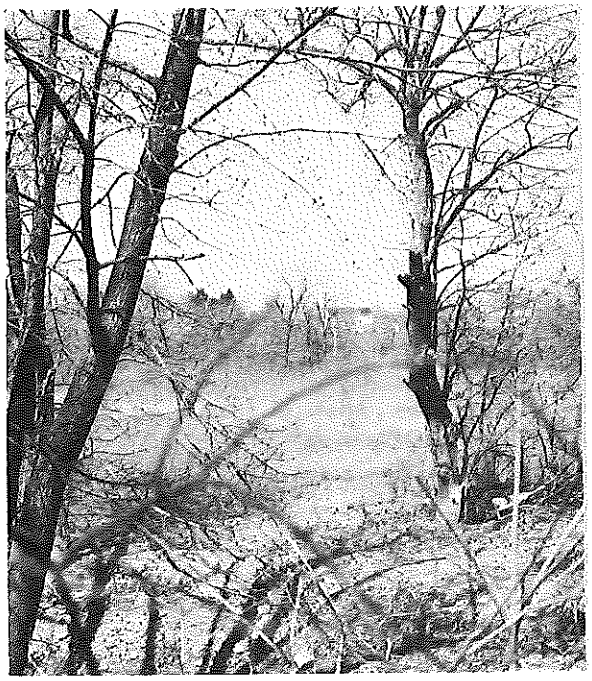
With the primary (visible) and secondary (not visible) areas mapped, it is possible to spatially locate visually sensitive projects occurring within ½ mile of the park. Although the Commission will review all development within

Photo 1



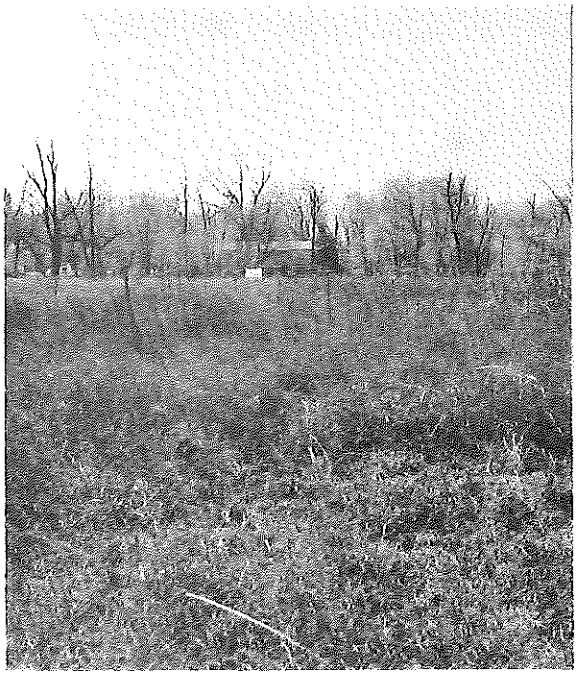
Farm silo: 1000 m (3300 ft., .62 mi.)

Photo 2



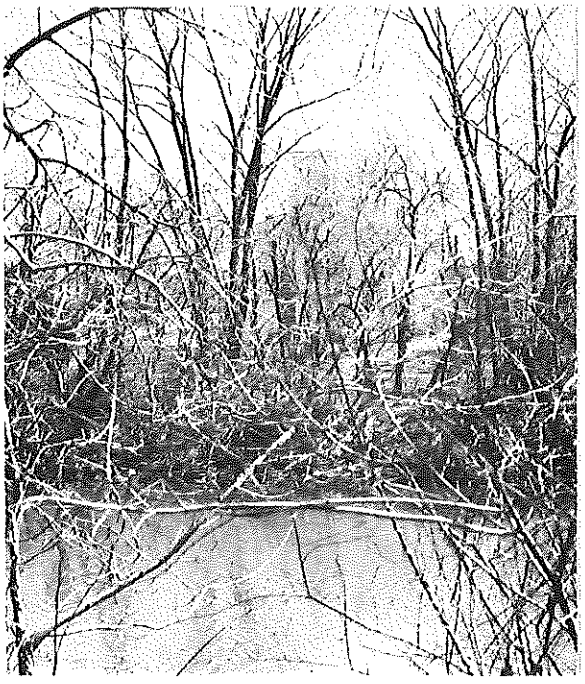
House: 550 m (1800 ft., .34 mi)

Photo 3



Sheet: 350 m (1150 ft., .21 mi.)

Photo 4



Church: 95 m (310 ft., .06 mi.)

the ½ mile zone for visual impact, administration of the review authority is made somewhat easier. This is because it is now possible to segregate development which is only potentially visible (i.e., within ½ mile) from that which is actually visible (i.e., not screened).

With any mapping, the usefulness of the map is only as good as its representation of actual site conditions. Therefore, the Commission can use the map to anticipate areas where special attention is required, but even for those areas not within the primary review area, field inspection is advisable. This is particularly true in the area of substantial topographic relief along the Delaware River.

VIEW MODIFIERS

In the Canal Park vicinity, as in most situations, there are three environmental elements which modify or control visual impacts. These are vegetation, landforms (topography), and existing structures.

Vegetation

At this stage, the potential of vegetation for creating experiences such as enclosures, canopies, or directed views is not a central concern of the Canal Commission. Rather, the concern here is with the effect of vegetation as a physical entity-- namely, its role as a barrier or screen to visual intrusions.

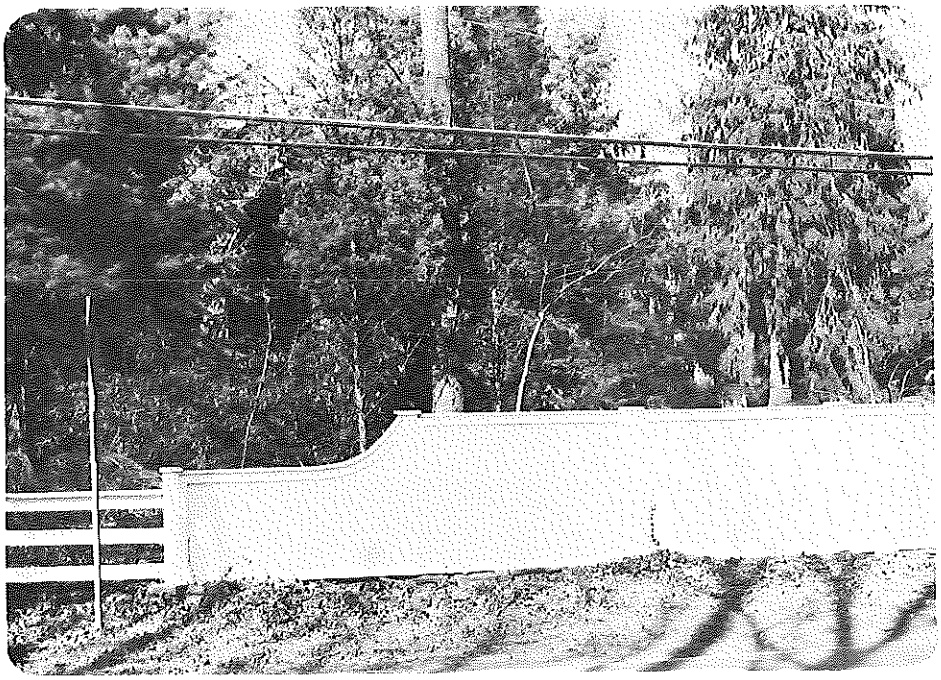
The Commission elected to use vegetation in winter as one of the bases for judging visual impacts, since in a highly deciduous plant environment this is the least effective screening. To document how effective leafless vegetation is as a visual buffer, the field team investigated the canal environs using a simple synthetic test. Each end of an ordinary bedsheet was attached to a pole. The two poles were planted in the ground and used to stretch the fabric taut, thereby establishing a visual target. The target was carried into different vegetation conditions to observe the effectiveness of the vegetation in reducing the target's visual impact.

The results show that in most instances the winter vegetation is an effective visual buffer when only a few hundred feet deep. Often it is effective when much narrower. This is particularly true along the Canal Park, where much of the vegetation is second growth or is an edge-community with a good deal of subcanopy stem and trunk development. A series of photos illustrate the results of the study:

In Photos 5 and 6, the pair of photos shows the same subject, a solid fence backed by evergreens, from two distances-- less than 50 feet and about 100 feet. Even in the closer photo it can be seen that shadows begin to break up the solid. As the distance between the subject fence and the viewer increases, two processes come into play. The fence is seen in the context of its surrounding, and vegetation begins to break up the solidity of the visual image.

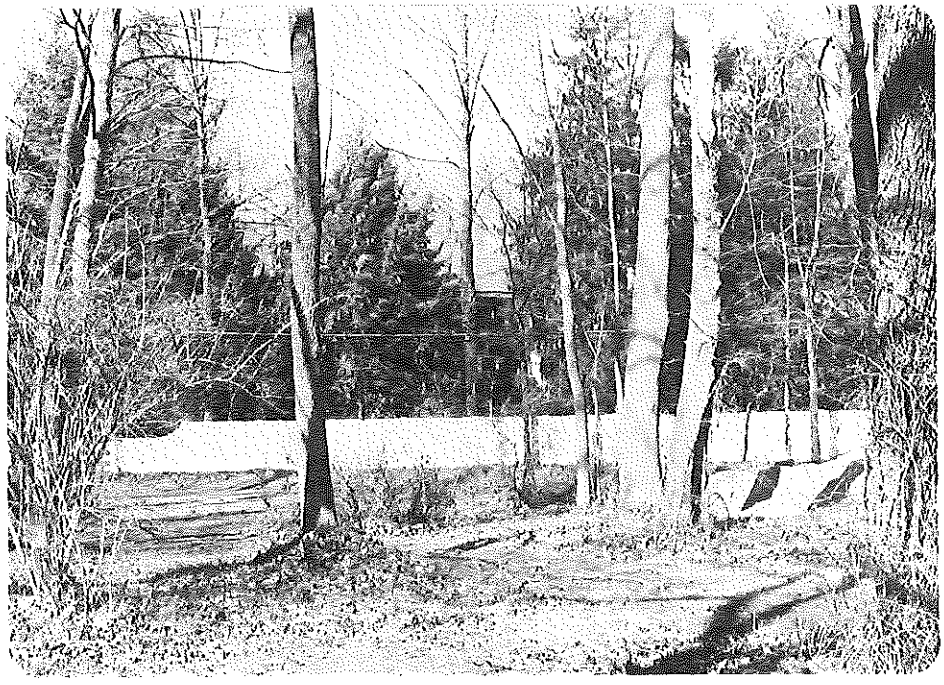
The color of the fence (white) causes it to stand out in contrast to its dark backdrop. This latter type of concern-- with contrast, color, texture, and surface materials-- is one the Commission will address when developing specific criteria for evaluation of impacts.

Photo 5



Fence: 15 m (50 ft.)

Photo 6



Fence: 30 m (100 ft.)

In Photos 7, 8, and 9, the set of three photos illustrate the interplay of distance and winter vegetation with the target.

In the first photo the target is 70 feet away in a thicket near the viewer. Beyond is a field backed by a second thicket. Even at 70 feet (21 m), the sparse thicket vegetation is beginning to break up the image. If we mentally create spring and add leaves to the stems in the picture, the target would likely vanish altogether.

In the second photo the target is moved across the field to the edge of the far thicket, and the viewer has moved out of the first thicket. Distance to target is 310 feet (95 m).

Moving the target 20 feet into the second thicket (photo 3) results in a substantial visual loss of the target.

The final set of photos shows various combinations of winter vegetation and distance-to-target.

Based on the experience of the field team, the conclusion was reached that winter vegetation is an adequate screen to most visual intrusions if 200 feet or more of it occurs between the viewer and the impacting structure. Therefore, when vegetation is the view modifier, the division between primary and secondary view areas occurs 200 feet into the vegetation stand.

The vegetation mapped is only that which is external to the Canal Park, and which is of a size and extent to warrant inclusion as a potential view modifier. The vegetation was mapped from recent aerial photography and a recent vegetation survey of the canal corridor.

Landform

Structures on the far side of a landform (e.g., hill or ridge), or which are set back from the crest of a landform, are not visible to viewers in inferior view positions. This is obvious in the case of structures which are clearly behind a landform. Less obvious is the case where a structure occurs near the crest of a landform. In this instance, the structure would be visible if the viewer were at a higher vantage point. But, given the low topographic position of the Canal Park, structures near the crest are generally out of the line of sight.

U.S.G.S. topography maps were used in determining what areas were liable to view as a consequence of the land's topography. It is fairly easy to determine what is clearly in view and what is clearly hidden; the difficulty comes when dealing with the relatively flat uplands or terraces which occur at the top of many of upslopes above the canal. This situation is particularly prevelant along the Delaware River where the river valley is somewhat incised into the landscape.

Photo 7

Sheet: 21 m (70 ft.)

Photo 8

Sheet: 95 m (310 ft.)

Photo 9

Sheet 100 m (330 ft.)

VARIOUS DISTANCES TO BEDSHEET TARGET

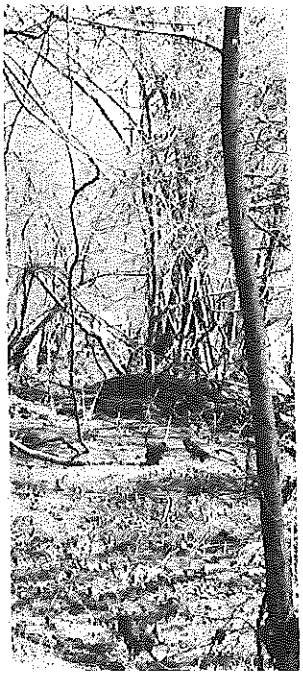
24 m (80 ft)

30 m (100 ft)

46 m (150 ft)

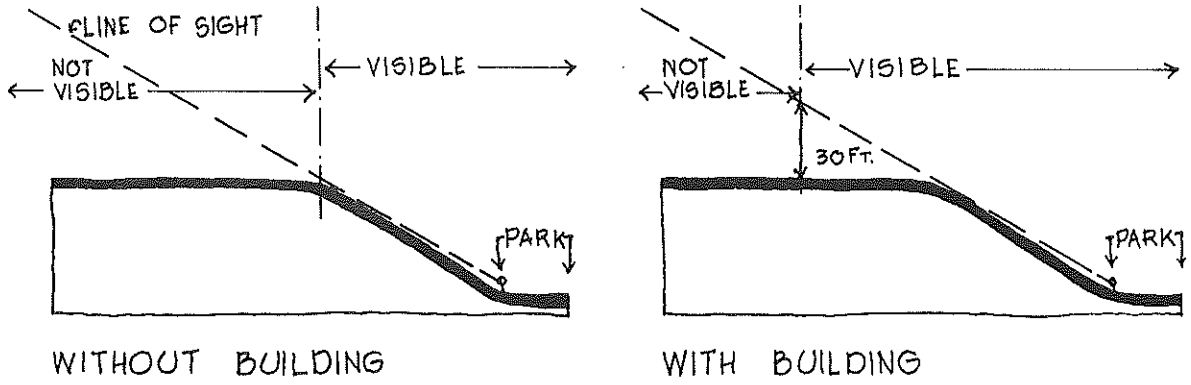
55 m (180 ft)

85 m (280 ft)



100 m (330 ft)

As a guide in determining where topography becomes effective in blocking structures from view, a three story(30 ft) building was assumed to represent a development. Quick cross-section sketches were made in areas where it was not obvious what lands were visible. The 30 foot high "structure" was inserted into the sketch and the location of invisibility-from-the-park noted. Thus, a close approximation of where topography is useful as a visual buffer was established.



WITHOUT BUILDING WITH BUILDING

It was found that in most instances vegetation precluded being able to see up the slope to any appreciable extent. Project-by-project inspection may cause some modification of this, because of the removal of some vegetation as a consequence of development.

In areas which are both vegetated and sloping, the mapping became graphically confused. Too much information was being put on the map. Therefore, a heirarchy of presentation was established. All vegetated areas are shown, and only those hill slope areas which are not vegetated are shown.

Structures

Individual structures, standing alone, are not substantial view blockers This is especially true when looked at by a mobile viewer.

Clusters of structures, on the other hand, can serve as effective view blockers. The heavily urbanized areas along the Canal Park-- notably in Trenton and New Brunswick-- are where this view blocking situation most frequently occurs. In the urban areas and denser suburban areas, rows of structures (with their associated landscaping and fences) are assumed to form a visual barrier for activities occurring beyond them.

Strictly speaking, this may not always be true, since view opportunities exist between structures, especially in a suburban setting. But, since these existing structures near the Canal park already establish the local visual character, anything occurring on the far side of them is assumed to not radically alter this character. Therefore, where a concentration of structures occurs, its outside edge is assumed to be the limit of the primary review area. Thus, the Commission will concentrate its attention on the interval between the Canal Park and these existing structures, rather than on the areas beyond them.

CONTEXT OF CANAL PARK ENVIRONS

In the course from Bulls Island on the Delaware River to New Brunswisk on the Raritan River, the Canal flows in and out of a series of human and natural environments. These range from the highly man-influenced and built areas of the cities to the rural-pastoral areas of the countryside between.

As an indication of the environs of the Canal, notations are made along the margin of the maps indicating the type of area through which it passes-- urban, suburban, or rural-- and its extent. These are general descriptions and do not necessarily relate to the descriptions of canal environments developed in the Canal Park master plan.

Urban areas are the highly built-up areas, such as Trenton and New Brunswick, which generally edge the park with a fairly dense array of structures. Suburban areas are those which are built-up but are less dense. Frequently these are small towns, or areas of mixed open space and development.

Rural areas are either "natural" or pastoral areas, where vegetation or farms predominate as the land use.

These are provided only to give the map user an idea of the cultural or natural context of the Canal park in any particular area.

Summary and Conclusion

The three major visual modifiers (vegetation, landforms, and structures) occurring within ½ mile of the Canal were mapped. A distinction between visible areas and areas not likely to be seen is made, with the former called the Primary Review Area and the latter the Secondary Review Area. Changes in existing view modifers will affect how these areas are demarcated.

The next step is for the Commission to establish the criteria it will use to evaluate developments in each of these areas. These criteria may include such considerations as:

Ambience of the Canal park
Context of area around the park
Extent of vegetation, earthworks, and structure change
Height of structures
Surface and roof materials and texture
Orientation of structures
Colors and use of attention getting devices
Proposed new landscaping

In using the maps generated in this study, in conjunction with the criteria eventually developed, on-site inspections will generally be required. This is to verify that the data has not changed, and to take note of particular local circumstances only a site visit will reveal.

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