CHAPTER EIGHT: VIEW PROTECTION

Visual Impact Analysis for Preservation of Historic Open Space Resources

John McDermon

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INTRODUCTION

Views into and out of Elysian Park are valuable resources that deserve to be protected from future development. Techniques have been developed in the field of Landscape Architecture to simulate the visual environment. Use of accurate state of the art techniques is essential to provide decision makers with adequate information about potential visual impacts and permit them to make informed decisions about future development. This chapter addresses the idea of view protection by first presenting an historical overview of the development of perceptions regarding the natural environment leading to a point today when the visual aesthetic of a landscape can be protected under national and state environmental statutes, such as the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA). The general system of visual impact assessment and visual inventories are presented as tools necessary for the NEPA and CEQA process to be able to consider visual aesthetics. A review of methods of perceptual simulation of the visual environment is offered as an instructional guide for those interested in pursuing this matter further. Finally, the chapter discusses how these tools and techniques could be used in Elysian Park to benefit all of Los Angeles.

HISTORY

As European civilization emerged from the Middle Ages into the light of the Renaissance, the fear of the wild and natural evolved in to an appreciation of the beauty of the natural landscape. Ambrogio Lorenzetti's frescos, painted in the late 1330s in Sienna, depicting the effects of good and bad government on the man-made and natural landscape represented one of the first uses of visual simulation to engage civic discussion. The Lorenzetti brothers and Simone Martini departed from the tradition of their day and treated landscapes "as illusionistic, spatial compositions meriting attention unto themselves."

Out of the Renaissance, the modern concept of the landscape transitioned through a period of picturesque landscape paintings depicting the bucolic beauty of soft rolling hills in compositions avoiding straight lines. In the early nineteenth century in America a group of artists and writers proclaimed the beauty of the landscape in its natural and wild state. In a new nation lacking the cultural antiquities of Europe, the natural wilderness of the continent could be a symbol of national pride. Nonetheless it wasn't until 1865, with Congress ceding the Yosemite Valley to the state of California as a state park, that the government took steps to preserve the natural landscape in its wild condition. The creation in 1874 of Yellowstone National Park, representing the first national park in the world, had a serious undertone which carries forward to today. Congress had to be convinced that the land contained no resources of economic value or that it was economically impractical to harvest these resources due to the remote location and rugged terrain.

Throughout the twentieth century appreciation of the value of the natural landscape as a resource worthy of protection has slowly grown from the creation of the National Park Service in 1916 to the Outdoor Recreation Resources Review Commission (ORRRC) established in 1958. The ORRRC issued its first report on the needs for outdoor recreation throughout the nation in 1962, which resulted in the Wild and Scenic Rivers Act and the National Recreation and Scenic Trails Act in 1968. The most telling proclamation of the importance of the visual landscape came in 1965 at the White House Conference on Natural Beauty. In her opening remarks Mrs. Lyndon B. Johnson proclaimed "*one of the most pressing challenges for the individual is the depression and tension resulting from the existence in a world which is increasingly less pleasing to the eye. Our peace of mind, our emotions, our spirit - even our souls - are* *conditioned by what our eyes see.*" The emphasis of the conference addressed the man made environment and its impact on the beauty of natural environment. The Highway Beautification act of 1965 is a result of this type of thought.

With the passage in 1970 of the National Environmental Policy Act (NEPA), legislation was in place to require evaluation of all the impacts of Federal actions on the environment. NEPA made it clear that the visual values and the visual quality of the landscape, were not only of concern to uniquely beautiful or ugly landscapes, but to all landscapes that were affected by federal design, planning or management activities. The requirement to document the effects on the visual landscape of proposed actions led to the development, by several federal agencies, of Visual Resource Management (VRM) systems. VRMs are a systematized set of guidelines to follow while assessing the visual landscape and making decisions about future impacts. The first agency to implement a form of VRM was the Forest Service which did research and conducted test studies on the proposed VRM system throughout the late sixties and mid-seventies. The Bureau of Land Management also developed its own system and published its guide to methods of visual simulation in 1980. The Soil Conservation Service published in-house technical document TR-65 outlining their version of a VRM in 1978, which was developed as a direct response to the passage of NEPA. CEQA offers the same protections to the visual environment that NEPA does, thus making these VRM systems also applicable for state and local agencies.

Through the sometimes hard-fought implementation of NEPA, the courts have slowly come to recognize the importance of an environment's aesthetic value. A particularly important case is the Overton Park, Memphis, Tennessee case filed by the Citizens to Preserve Overton Park. As case law has evolved, the courts have undergone a three stage shift in issues concerning environmental aesthetics, from ignoring them, through fictionalizing or masking the aesthetics under other issues to "facing up to the procedural right to address aesthetic injury in an anthropocentric sense of the present human user." The authors of *Foundations for Visual Project Analysis* offer a table (included in the appendix) which summarizes the significant court cases settled since the passage of NEPA which considered aesthetics as part of or all of the courts rulings.

Given the increasing sense of importance and standing attributed to the aesthetic value of the natural landscape, Elysian Park takes on an added sense of importance to the City of Los Angeles. As the oldest remaining open space still in natural setting, Elysian Park and its views are valuable resources for the City of Los Angeles and are worthy and deserving of protection. Three different types of views can be identified:

- Views wholly internal to the Park - such as the view of palm hill from Stadium Way

- Views from within looking out at the surrounding city - such as the views from Angel's Point or any of the other over look points along the top of the Park.

- Views from the city looking into and at Elysian Park - such as looking north from Chinatown or west from County USC Medical Center.

The remainder of this paper is intended to briefly introduce the tested and effective processes used to document and protect natural aesthetic viewscapes which could be used at Elysian Park.

CHRONOLOGY: OVERTON PARK DEVELOPMENT

1819	Founding of Memphis; Judge Overton's town plan includes four park squares and river promenade.
1858-1863	Frederick Law Olmsted, Sr., and Calvert Vaux first work at Central Park in New York City.
1882	George E. Kessler returns from landscape studies in Europe, corresponds with F. L. Olmsted, Sr., and moves to Kansas City.
1889	Judge L. B McFarland begins crusade for public park system in Memphis.
1891	Kansas City adopts Kessler's plans for park and parkway system.
1898	J.J. Williams elected mayor; platform includes goals of Greater Memphis Movement.
1898	Representative of Olmsted firm, likely John C., visits Memphis to investigate potential park system.
1899	Tennessee state legislature authorizes establishment of Memphis Park Commission.
1900	City establishes Memphis Park Commission: Judge L.B. McFarland, charirman; Robert Galloway and John Godwin, commissioners.
1901	City acquires Lea Woods from Overton Lea; area renamed Overton Park.
1901	Memphis Park Commission requests proposals for system of "parks, drives and boulevards." Olmsted Brothers and Kessler respond; Kessler selected.
1902	Riverside Park acquired.
1902-1904	Main pavilion at west end, picnic pavilion at east end and lake ("Rainbow") constructed in Overton Park.
1904	Louisiana Purchase Exposition (St. Louis World's Fair); George E. Kessler, chief landscape architect.
1904	Clara Conway Memorial Arbor constructed in formal garden, Overton Park. Demolished by storm, 1936.
1905	U. S. Supreme Court ruling in Memphis v. Hastings clears the way for development of Parkways.
1906	Overton Park golf course esablished., first public golf course in region.
1906	Establishment of Memphis Zoo.
1908	Jenny M. Higbee Memorial built near later site of Brooks Museum. Moved near formal garden ca. 1959.
1911	Overton Park playground developed, first of its kind in Memphis.
1914	Japanese Garden located around lake at present site of Memphis College of Art. Gift of Robert Galloway. Destroyed in 1941.
1914	Duke Bowers wading pool at Overton Park playground opens. Closed ca. 1979.
1916	Brooks Art Gallery constructed, James Gamble Rogers, architect.
1917	Egyptian temple built near zoo entrance to house gate stone from temple of Ptah. Stone now at MSU.
1917	Pavilion dedicated to park commissioner Willingham built near Brooks, adjacent to golf course.
1926	Overton golf clubhouse constructed, gift of Abe Goodman, park commissioner. E.L. Harrison, architect.
1926	Doughboy memorial statue unveiled in Overton Park. Nancy Coonsman Hahn, sculptor.
1930	Bell Tower to honor park comissioner McFarland built near present site of Memphis College of Art. Hanker & Cairns, architects.
1936	Overton Park Shell built by WPA. Max Furbringer and Merrill Ehrman, architects.
1936	Memphis Street Railway waiting shelters constructed at zoo entrance.
1955	Overton Park entrance "gates" erected at Tucker Street and Poplar Avenue.
1957	Memorial to Mayor E.H. Crump dedicated. Donald Harcourt Delue, sculptor.
1959	Memphis Academy of Arts moves to Overton Park from Victorian Village. William Mann and Roy Harrover, architects.
1959	Memphis Aquarium established as part of zoo. Gift of Abe Plough.
1960s	Black citizens afforded unrestricted access to Overton and other Memphis parks.
1960s-1970s	Principal years of dispute over I-40 route. 1971 U.S. Supreme Court ruling in favor of Citizens to Preserve Overton Park halts construction of interstate through Overton Park.
1973	Second addition to Memphis Brooks Museum of Art opens.Walk Jones and Frances Mah, architects.
1979	Overton Park Historic District entered in National Register of Historic Places.
1985	Memphis Academy of Arts name changed to Memphis College of Art.
1986	Memphis Zoo and Aquarium Master Plan by Design Consortium, zoo planners.
1987	Memphis Brooks Museum of Art expansion designed. Skidmore, Owings & Merrill with Askew, Nixon, Ferguson & Wolfe, architects. Construction completion 1990.
1988	Overton Park Master Plan approved by Memphis Park Commission. Ritchie Smith Associates, landscape architects.

Overton Park, Memphis, Tenn.

Overton Park, a wooded recreational area in downtown Memphis, described by Michael Frome, writing in *American Forests*, as one of the "finest urban forests in the world," has been threatened since 1957 with bisection by a federally funded, through-town expressway, an extension of Interstate 40. Years of public hearings, court battles, judicial decisions and remanding of decisions leave the fate of the park uncertain. The Citizens to Preserve Overton Park, a citizens group that has long spearheaded the drive to save the parkland, has been aided by five National Trust matching consultant service grants. The committee's tireless efforts for the last 18 years have thus far preserved the park, but preservationists are still struggling against the encroaching highway whose pavement has been laid to the park edges. Despite continuing citizen pleas for preservation of the open space, Tennessee officials hope that in 1975 the U. S. Congress will approve legislation that will exempt the highway construction from certain environmental protection laws and provide funds to complete the interstate through Overton Park.

"Now, Henry, there's this park down in Memphis, Tennessee . . ."

Drawing by Draper Hill; The Commercial Appeal (Memphis, Tenn.), January 26, 1973

A key component of the process is documentation, which will involve some form of visual simulation of both the existing landscape and any proposed changes. To aid in an understanding of just what visual simulation is, a review of the current techniques will be offered. This is intended to be introductory in nature; additional information on techniques and applications of those techniques can be found in the material presented in the bibliography.

PROCESS OF VISUAL IMPACT ANALYSIS

The generalized process of visual impact analysis as presented by Sheppard (a practicing professional in the field) involves four phases: inventory, impact assessment, mitigation and monitoring. In discussions with Professor Bosselmann, of the Environmental Simulation Laboratory at Berkeley, he points out that even before a specific project is proposed an agency or group can still take steps to protect view assets. This would involve an abbreviated process of:

- Inventory: including identification of critical views.
- Impact assessment: involving identification of the most vulnerable views and what the potential impacts may be.
- Mitigation: in this case, development guidelines or suggestions about how to avoid or minimize impacting the previously identified critical views.

Visual Inventory

The creation of a visual inventory considers several interrelated aspects involved in assessing the visual landscape leading to a description and evaluation of existing conditions. Sheppard presents the following aspects:

Overall Visual Character: Patterns of land form, vegetation, water, land use and structures.

Scenic or Visual Quality: The attractiveness or distinctiveness of the landscape, site or built projects.

Viewing Conditions: The viewpoints from which the landscape, site or project is seen, the distance and viewshed (visible area) over which it is seen and typical lighting and visibility conditions.

Viewer Characteristics: Number of viewers, frequency and duration of viewing and type of activity in which the viewer is taking part (for example, recreating at a particular location versus driving from work).

Viewer Sensitivity: The degree of concern that viewers have for the existing visual qualities (for example, how much they care about a local mountain view or open space).

Landscape simulation typology

	Perceptual	Conceptual
Static	Photographic: aerial on-site slides Photomontages Perspective drawings Physical Models Composite Techniques	Functional Diagrams Map Site Analysis Plans and Diagrams Site Plans Working Drawings
Dynamic	Animation Computer Generated Perspectives Movie Films: on-site models Video	Computer Analog Models Computer Maps Radar

Figure One

Visual Policies: Regulations or guidelines affecting visual resources, enacted by government agencies with responsibilities for land management and planning. Examples that can apply to a project might include scenic highway designations, wilderness area management policies, design review guidelines, and conservation area stipulations.

Each of these attributes can be analyzed through a combination of field surveys, maps, interviews documents and photographs. Additional areas of interest resulting from the above issues are; the degree to which a landscape can absorb change without impact (called visual absorption), the amount of viewer concern for visual change (which may be affected by the type of change proposed), and the degree of visibility of any proposed changes. This is one of the roles of visual simulations.

Specific to Elysian Park, a visual inventory should attempt to identify and quantify (most effectively through photographs taken in accordance with the guidelines described in the annotated bibliography under Bosselmann) the views deemed most critical by the public. After these views have been accurately identified and the corresponding viewsheds plotted on maps, an assessment of the most threatened views should follow. At the current time this can be done by reviewing the surrounding district plans and proposals for City North development, discussing development plans with agencies already within and adjacent to the Park (the Dodgers, DWP, LAPD, LAFD, Barlow Hospital) and estimating densities of likely development onto an overlay of the viewshed maps. In this composite the critical views most likely to be affected can be identified. Adding a time dimension to the development predictions will increase the ability of the reviewer to target simulations to the views most immediately threatened.

Impact Assessment

The visual inventory data then becomes part of the visual impact assessment process diagrammed on the following page. Lacking information regarding the specific timing or phasing of development projects, the concepts of visual prominence, view obstruction and design quality can only be postulated at this time.

Embarking on a visual assessment process prior to the actual proposal of specific development is a strong position to be in. This will permit the Park's advocates to take a proactive role in establishing an agenda along with requirements for evaluating future development proposals. If it is possible to conduct the visual impact analysis process prior to development then through the application of appropriate visual simulation techniques, it may be easier to persuade the appropriate governmental agencies to adopt appropriate development guidelines. Subsequently, the next two steps of the overall visual analysis process, visual mitigation and monitoring impacts take on a proactive dimension. The mitigation measures would be incorporated into the design guidelines and could include a quantitative measure of permissible visual impact. Compliance with the guidelines would become mandatory as is compliance with building codes. The monitoring of the impacts would then fall under the jurisdiction of the permitting agency.

Since each of the last three steps in the process involve predicting impacts of construction and alteration on the environment before it actually occurs, the degree of accuracy used in the representation of impacts becomes critical. This is the role of the visual simulation.

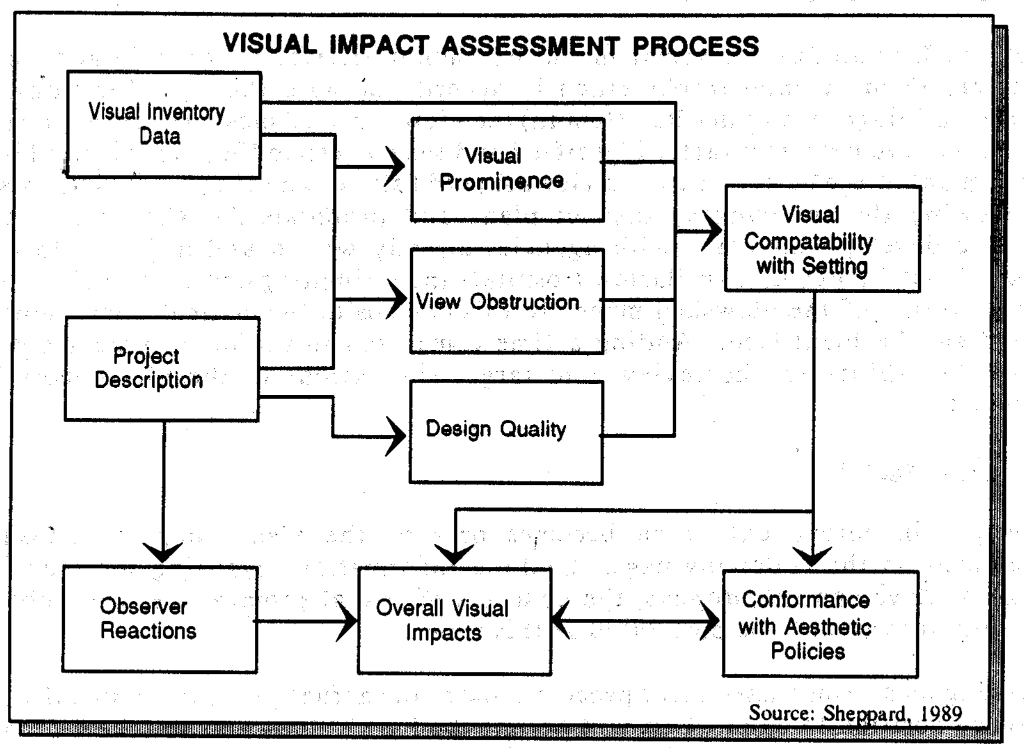
VISUAL IMPACT ASSESSMENT PROCESS
Visual Inventory Data
Visual Prominence
View Obstruction
Design Quality
Project Description
Visual Compatability with Setting
Observer Reactions
Overall Visual Impacts
Conformance with Aesthetic Policies
Source: Sheppard, 1989

Figure Two

VISUAL SIMULATION TECHNIQUES

As Zube, Simcox and Law point out:

> *A casual review of recent literature in landscape architecture and related fields might lead one to conclude that there is an ever increasing reliance on the use of visual simulations in landscape design, planning and research.*

This is due to the fact that most people, while aware that the process of drawing is necessary to get a building built, don't consider it a simulation. In fact, conventional construction drawings are simulations. Simulations of construction are nearly as old as the art of construction itself. One of the oldest methods of simulation is still one of the most widely used. History reveals the use of models in construction prior to the invention of paper and pencil. To clarify the types and roles of simulations the authors offer a matrix (adapted from McKechnie, 1977) which is reproduced on the following pages.

Unfortunately current environmental review processes tend to be limited in their ability to make accurate judgements. Typically the simulation methods used to represent proposed development are limited to the static conceptual methods listed in the upper right quadrant of the matrix. In fact, the simulation techniques most commonly used in environmental analysis were found to create a negative bias. In other words, the simulation techniques made the proposals look worse than the actual view.

Like Zube, Simcox and Law's article, this discussion will be limited to the perceptual types of simulations. Each of the techniques will be presented with a discussion of the advantages and disadvantages. Where available, an example of the application of the method will also be presented for clarification.

Aerial Photography

Vertical. High level vertical aerial photography, including satellite imagery, is now commonly used in the fields of forest and range management. More representative of the character of the terrain than topographic maps, this type of imagery can be used in plotting viewsheds for proposed development, particularly roads and power lines. Aerial mapping services maintain files of photos on-hand and enlargements of existing black and white images are usually less than one hundred dollars. The problem with these images may be their age and scale. File images are at a scale similar to that used in the Thomas Bros. map books. Enlargement to a useful scale for individual site analysis can create a grainy image that is difficult to read. The other problem is the age of the images. They are normally three to five years old, unless the mapping service recently reflew the area of interest. If the analysis does not require details of recent facilities then the file images would be adequate. Both of these problems can be corrected by requesting a special flyover. This would cost over one thousand dollars for a simple single pass and the need for multiple images increases the costs dramatically. The advantage is that the image will be current and shot at an altitude appropriate for the scale desired.

Oblique. Low level oblique aerial photography offers a unique opportunity to capture a development site within the context of the surrounding environment. Keeping the angle low enough allows the representation of vertical scale and an assessment of bulk. Due to the focussed nature of these photographs they each must be specifically flown with explicit instructions for the approach, field of view and angle of the photo. This can be very expensive. The results, however, can be very convincing.

TABLE 2 SOME GENERAL ADVANTAGES AND DISADVANTAGES OF SIMULATION MEDIA

Media	Fundamentals			Principles			Functional Considerations							
	Understanding	Credibility	Bias	Representativeness	Accuracy	Visual Clarity	Interest	Legitimacy	Cost	Flexibility	Ease	Speed	Portability	Durability
Rendering				D. May omit project context	D. Least constraints on inaccuracy				*Unit costs:* low to high *Equipment costs:* low	Fair	Easy to difficult	Fast to slow	Good	May degenerate with time
• Line	G	P	P											
• Tonal	G	P	P											
• Full Color	G	P	P											
Photomontage				A. Possible to show alternative viewing conditions (e.g., lighting) A. Shows project context				A. Relationship to reality is clear	*Unit costs:* low *Equipment costs:* low	Fair	Easy to difficult	Fast	Good	Degenerates with time
• Black & White	Varies	P	P											
• Full Color	Varies	Varies	Varies											
Photo Retouching				A. Possible to show alternative viewing conditions A. Shows project context	A. Photograph imposes constraints on inaccuracy			A. Relationship to reality is clear	*Unit costs:* moderate *Equipment costs:* low	Fair	Difficult	Varies	Good	Degenerates with time
• Black & White	G	Varies	P											
• Full Color	G	G	G											
Multiple Projection	Varies	P	?	A. As for photomontage		D. Often poor	A. Limited special effects		*Unit costs:* low *Equipment costs:* moderate	Low	Easy	Fast	Poor	Degenerates with time
Computer Perspective				A. Multiple views easily produced	A. Eliminates guesswork on scale, position, and shape	A/D. Varies	A. Good if interactive	A. Visible documentation of data	*Unit costs:* low to high *Equipment costs:* moderate to high	High	Moderate to difficult	Fast	Good	Easily stored and regenerated
• Wire-Frame	Varies	G	P											
• Hand-Rendered	Varies	G	?											
• Solid-Modeled	G	?	?											
• Texture-Mapped	?	?	?											
Videosimulation						D. Resolution limits	A. Special effects		*Unit costs:* low *Equipment costs:* moderate to high	High	Easy to moderate	Fast	Fair	Easily stored and regenerated
• Low Resolution	G	Varies	?	A. As for photomontage										
• High Resolution	G	G	?	A. Multiple views easily produced										
Animated Computer Graphics				A. Multiple and sequential views possible	A. Eliminates guesswork on scale, position, and shape		A. Motion involves the viewer		*Unit costs:* high to very high *Equipment costs:* high to very high	Fair	Difficult	Varies	Fair	
• Wire-Frame	Varies	?	?											
• Solid-Modeled	G	G	?											
• Texture Mapped	?	?	?											

Media	Fundamentals			Principles					Functional Considerations					
	Understanding	Credibility	Bias	Representativeness	Accuracy	Visual Clarity	Interest	Legitimacy	Cost	Flexibility	Ease	Speed	Portability	Durability
Film/Video Matting	?	?	?	A. Multiple and sequential views possible			A. Motion involves the viewer	Low	*Unit costs:* high *Equipment costs:* high to very high	Fair	Difficult	Slow		
Hologram	?	?	?	A. Multiple views possible			A. Novelty		*Unit costs:* very high *Equipment costs:* very high	Low	Difficult		Poor	
Model				A. Multiple views possible D. Often omits project context	A. Eliminates guesswork on scale, position, and shape			A. Visible documentation of data	*Unit costs:* moderate to high *Equipment costs:* low to moderate	Low	Easy to difficult	Fast to slow	Poor	Difficult to store
• Simple	Varies	Varies	P											
• Detailed	G	G	G											
Site Mock-up				A. Multiple views possible A. Shows project context	A. As for models			A. Relationship to reality is clear	*Unit costs:* moderate *Equipment costs:* moderate		Easy	Fast		
• Scale Markers	G	G	?											
• Project Replica	G	G	?											

Key

G. Typically good
P. Potential problems
A. Advantage
D. Disadvantage

At Yokota Air Base in Japan, the Air Force Civil Engineers were struggling with a base that appeared physically built-out. Yet more and more people were being programmed to arrive over the next five years. As part of the 20-year-plan for physical base development a helicopter was used to take low level oblique photographs of all the proposed development sites. These photographs were then rendered on, using conventional drafting techniques. The resulting composites were rephotographed to slides to present a simple massing simulation of all the proposed future development. Several decisions about facility mass and siting were revised when the composites revealed unfavorable potential impacts on views and relationships that were not evident in the conventional drawings.

On-Site Photography

On-site photography is perhaps the most common method of simulation, the use and applicability of which has been widely discussed. A word of caution is needed, however. Taking pictures or viewing pictures of a site without regard for the lens used and the angles of view will result in misrepresentations, either intentional or unintentional. Bosselmann's studies at UC Berkeley have revealed that the correct focal length lens for photographing landscapes with a 35mm camera to keep objects in proper relation to each other is 65mm. A wider angle lens, even the 50mm sold with most cameras will make distant objects appear smaller and more distant than the eye would see them. Conversely a closer focus lens, or telephoto lens makes distant objects appear closer than they would actually appear with the naked eye. These phenomena are manipulated everyday to the advantage of the film maker and can be used to over emphasize or de-emphasize the impacts of a proposed development.

The critical relationship between the focal length of the lens and the viewing distance used to observe the image can significantly alter the impressions received from viewing a specific simulation. It is important to realize that the correct viewing distance for a slide taken with a 65mm lens projected to a four foot wide screen is 7'-5". Viewing the same image in a 4" x 6" print requires a viewing distance of eleven inches. For more discussion about the technique used to calculate the correct viewing distance see the annotated bibliography.

Aware of these possible misrepresentations, photographs and slides are powerful tools for representing the environment. In fact, since the photograph actually captures the environment at a moment in time it doesn't represent a simulation of reality, rather it could be called a surrogate reality.

The one area subject to improvement and debate is the ability of photography to accurately represent color. The number and complexity of the variables affecting color rendition on film are beyond the understanding of most people. But, since in some simulation experiments color has been identified as an important contributing factor to a simulations validity, the possible misrepresentation of color in photographs should be considered.

Photomontages

After an image of the existing landscape is captured on film the print or slide can be manipulated and then represented as a simulation of the future. Various techniques can be used. Two separate approaches are common. One involves a combination of drawing or rendering and photography like the Air Force example cited previously. The other involves the compositing of two or more images to represent the future condition. A common use of this method is in design of long-distance power lines. Photos of existing high-tension power-line towers are composited with photos of the existing landscape along a proposed route to simulate the visual impact of different rights of way and tower spacing decisions. Several examples of this technique are provided in Sheppard's book.

Computer Image Manipulation

As computers become more affordable and the computing power available increases, much of the process described above can be done digitally on a computer screen. The advent of color digital scanners and slide and video output devices permits images to be captured by any number of photographic or video methods and converted into digital information stored on the computer. Once in the computer, the information can be manipulated in any number of ways using "painting" and "photo touch-up" type programs. A combination of drawing and compositing can then be accomplished. At the University of Illinois at Urbana-Champaign the students painted in the scale image of a proposed water tank and then wrapped them with a "texture map" of appropriate colors and textures captured from other similar tanks. The results were then output to video and shown at a public hearing. The short presentation successfully refuted any claims by the water agency that the tanks would not be visible.

The speed with which these images can be produced and the ability to replicate portions of images to simulate growth over time makes this technique very powerful. The output can be in the form of video, slides or high quality color separations depending on the intended use and the same image can be output all three ways with no degradation in quality. The recent introduction of 24-bit color capabilities on the Apple Macintosh II line of computers make this technique viable on upper end home computers, where just a couple of years ago this required the use of mini computers costing into the hundreds of thousands of dollars.

This technique is perhaps ideally suited to depict what Dodger Stadium would look like with a landscaped parking lot, or the impact of any proposed parking structure on the views of the Stadium.

Perspective Drawings

The conventional method of representing a project, particularly a single building, is through perspective renderings. The best architectural delineators can rival architects themselves in the fees collected for their services. Often the purposes of the renderings are marketing and sales oriented and, as such, both their validity and reality as simulations should be questioned. In his research reviewing over 300 projects involving renderings Sheppard found the overall accuracy of the
renderings to be quite low.

Most simulations contained pronounced differences from real views, notably:

- omission of 'clutter' often associated with the project, e.g., utilities, cut and fill scars, perimeter fencing, etc;
- restricted view or complete omission of the project's landscape context, e.g., adjoining highways, buildings, and distant backdrops;
- abstraction of detail and texture, and omission of full-color and tonal values;

- depiction of the wrong shape, details, color, and tonal contrasts of the project.

Because of the time-consuming nature of the process of production, perspective renderings are seldom developed for more than a few key views. These are most often at the designer's choosing and seldom reflect the areas of a project requiring evaluation from an impact point of view. As such perspectives are very static.

Considering these cautionary notes, perspectives can still be used successfully for simulations and evaluation. One of the more recent successful uses of perspective drawings is in the award winning work *Dealing with Change in the Connecticut River Valley: A Design Manual for Conservation and Development* prepared by the Massachusetts Department of Environmental Management. Using a series of colored schematic aerial perspectives and colored site plans, selected sites are portrayed as they exist today, as they may look in the future following conventional development, and how the same sites would look following creative development guidelines. Though the sense of realism is minimal, the viewer receives a good comparative sense of how the landscapes would be affected by the different development scenarios. This is aided by the consistency in view and color from rendering to rendering, and results in a set of perspective renderings which make assessment of the development scenarios easier than would plans alone.

Since the areas affected by any development on the Bishop Canyon landfill site are limited to those few sites above the landfill and the views are primarily in one direction across the fill site, a series of perspective renderings could be used to represent design alternatives for the site. These should be in color and scaled accurately to properly represent the visual impact on the views of the city skyline beyond.

Physical Models

The use of models to represent the built environment is one of the oldest techniques of simulation known. Models were constructed of St. Peters in Rome that were big enough to walk through. In the 1970s, during the final design stages of Phoenix's new airport terminal, a large scale interior model was commissioned to assist the artists who were commissioned to create the public art in assessing the viewing areas of each piece of art. These are both examples of architectural models being used to assist in the design process. Modeling for visual simulation purposes can be very different.

First, the modeling of landscapes requires a trade off in scale. The scale needs to be large enough to discern pertinent features yet, due to the size of the areas being modeled, architectural scales are impractical. For instance a model of Elysian Park at a scale of 1" = 50' would be seventeen feet square. Models of this size have been developed for visual simulations at the Environmental Simulation Lab at Berkeley. One study conducted there included a 25-minute drive through a landscape in Marin County that was used to compare reactions of people viewing movies of a model of Marin County vs the reaction of people driving through the actual landscape. The correlation was in most cases over 95% resulting in a validation of the model photography techniques used at the Sim Lab.

The Sim Lab was commissioned by the City of New York Municipal Art Society to model the development potential around Times Square allowed under current zoning. In constructing the models of the high-rise buildings, photographs were taken of the facades with a perspective correcting lens which were then glued to solid models of the existing buildings. Signs were constructed in a similar fashion, and lead casting techniques were used for the street fixtures and furniture. To project into the future, photos were taken of other high-rise buildings in other parts of New York and applied to massing models representing the limits of existing zoning. Models were developed for the 22 development sites surrounding Times square and a video was made depicting incremental development over time. This video (which was narrated by Jason Robards) was used in public hearings to present the possible overbuilding that the current zoning would allow in hopes of generating enough interest to revise the zoning in spite of pressure from the land owners. The future view of a Times Square dominated by office towers looking just like any other street in Manhattan was so compelling that revised zoning was developed based on the recommendations made in the film.

This technique, though very convincing, is time consuming and very costly. The model simulation of the West Side Highway in New York cost over $25,000. But for highly visible public debates concerning costly development proposals, where mistakes are difficult and expensive to erase, the thousands of dollars spent on a simulation can be money well spent. It is important to note that accurate visual models are not the only piece of information needed to evaluate options. A very detailed and functional model was made to study the aesthetic effects of alternative management strategies on Niagara Falls. One of the strategies included the removal of some of the rock at the base of the falls. In spite of the accuracy of the portrayal of the change and the increase in the aesthetic beauty, when information was provided about the natural process of erosion on the rocks, the public was against any change - a much different response than the one the public gave without the information about the erosion.

Composite Techniques

Composite techniques involve the combination and superimposition of various graphic techniques into composite images (photos, slides or video) representing future versions of existing environments. The Bureau of Land Management and the Forest service have both published handbooks offering guidelines on the use of various composite simulation techniques. The simplest of these methods is the cut and paste method of combining different photographs. Combinations of computer graphics and photographic techniques are also common and becoming more accessible as discussed above. Smardon suggests the use of renderings of low altitude photographic prints and slides to evaluate large scale design alternatives; for small scale designs he suggests modelscape photography and photomontage simulations. Air brushing of various alternatives for nuclear plant cooling towers and other types of power plants and their smoke plumes has been used to assess the aesthetic impacts of design alternatives. A multiple exposure technique has also been used to simulate sunlight over playgrounds and vegetation differences offered by different aspects of landscape development.

A composite of photos of the existing Police Academy site and renderings of any proposed construction should be required as an absolute minimum. A dynamic composite of model photography and computer generated perspectives or renderings would permit views from the various points of the Park which may be affected by increased development on the site. This later technique would be preferable, perhaps even mandatory, to permit intelligent and informed decisions about future development.

Dynamic Simulation Techniques

Many of the techniques available to dynamically simulate an environment have already been discussed in the sections concerning the basic static technology. Animation is the careful representation of a sequence of views depicting motion or growth over time. The Sim Lab video about Times Square is an example of a combination of photography, model making, animation and video production into a cohesive presentation. Computer generated perspectives, because of their ability to be altered easily by manipulating the data permit visual simulation of eye level "walk through", "drive bys" and "aerial flights" depending on the scale of the simulation. Another advantage to computers is the ability to link graphic information with data. This power has been instrumental in the development of the TUUMS (Toronto University Urban Modeling System) software which allows rapid extrapolations of traditional land use control methods (zoning, height restrictions, FAR, setbacks, etc.) into three dimensional solid computer renderings. A similar technique may prove useful in evaluating impacts of proposed development in "City North" on views from and to Elysian Park.

Films have been used when precise detail and accuracy is needed such as in the Marin County landscape simulation conducted by the Sim Lab. This may be in part due to the lack of resolution and general poor quality of video images available at the time of the study. The emergence of low-cost, higher-resolution color video such as Super VHS and ED Beta counters many of the previous criticism of the video medium. The recent availability of low cost video capture and generation boards for the Apple Macintosh II computer makes it possible to create computer-digitized video animation on a relatively low-cost personal computer. The Imaging Systems Laboratory at the University of Illinois at Urbana Champaign is researching the applicability of various techniques of computer imaging and video presentation for assessing the impacts of various changes in the visual environment. One of the more interesting uses is an attempt to assign an economic value to various types of street tree plantings by presenting videos of the options to real estate brokers and asking them to appraise the same properties with different planting schemes. The future creation of high definition (HD) TV promises to increase the use of video in future simulations.

A video of the affects on Palm Drive of any widening plans which would remove or relocate the palm trees would provide excellent visual information from which informed decisions could be made about road alignments and design alternatives.

Technical wrap up

The variety of methods offered at first seems overwhelming in both diversity and application. Sheppard and Smardon, Palmer and Felleman offer two different tables in an attempt to organize the volume of information and choices available when attempting to select an appropriate method for simulation. The Smardon, Palmer and Felleman table organizes the body of simulation studies by scale and area of evaluation. The Sheppard table organizes the different methods of simulation by media and offers assessments of applicability, validity, cost, ease and speed of preparation. These two tables essentially present in a capsulated format enough information to select appropriate areas for further investigation.

NEXT STEPS FOR ELYSIAN PARK

The first step in attempting to protect some of the views from and to Elysian Park is a Visual Inventory. Remembering the discussion with Professor Bosselmann, this would involve the following process:

- Identifying all the vista points and potential views inside and out of the Park. - Topographic maps of the Park and surrounding area available from City Hall are quite useful in identifying the high points of the Park which will offer the best views.

- Assessment of the accessibility and frequency of use for each of the points. - This should take into account any future access improvements proposed in the Master Plan or Capital Improvements Plan. Since the location of the Park allows it to function as a short cut for many downtown office workers and the presence of Dodger Stadium bring thousands of ball fans through the Park each season, some measure of the opinions of the people who drive through the Park, as well as those who use the Park for conventional recreation should be developed.

- Identification of the most accessible and/or used views. - This should take into account the findings of the previous step.

- Plot the viewshed for each location. - This should be on a map large enough to include the extent of the view.

- Survey the potential development within the defined viewsheds. - If specific plans are unknown at this time, then massing studies representing the extent of permissible development similar to the Times Square study can be used. These types of studies may prove more enlightening than actual development proposals.

- Identify the view sites under the most immediate threat.

- Select method for simulation. - The specific method of simulation selected will be influenced by the extent of the simulation, the audience, the intent and the budget available. Given the impact that scenic views from the Park offer when viewed for the first time, photography should be a part of any method of simulation to increase the realistic aspect of the simulation.

<u>View Site Identification</u>

The attatched topographic map has been prepared and annotated with the elevations and locations of numerous sites through the Park. The elevations of the top of Dodger Stadium and the field and offered for reference. This is offered as an orientation tool to aid in the development of the view site identification and assessment. The identification or lack of identification of a site on this map should not be considered a value juddgement at this early stage of the process.

<u>RECOMMENDATIONS</u>

- Critical view points and their associated viewsheds should be identified and mapped.

- Those view points subject to the most immediate threats should have their viewsheds simulated with the idea that proactive guidelines be developed in advance of any proposed development.

- Considering the close proximity to downtown communities and the historical significance of the Park, any environmental review process concerning development impacting any of the identified viewsheds should require a complete visual impact analysis following the federal guidelines offered in the publications noted. This analysis should be used to develop acceptable mitigation measures and permissible limits of visual intrusion.

- Visual impact assessment techniques should not be limited to the environmental review process. The City Council and Planning Commission make decisions on a daily basis that impact the visual landscape of our city. City regulations should be developed requiring accurate simulation of any alteration to the visual environment requiring public agency approval. These simulations should use state-of-the-art techniques and follow the accepted guidelines presented in the literature. At the very minimum a simulation should include an accurate depiction of the relationship between the proposed project and the visual context and setting surrounding it.

CONCLUSION

The Federal Government, the State of California through CEQA and the courts have upheld and protected the value of the visual landscape for nearly two decades. It is time that some degree of protection is developed and offered to our local natural visual environments. A visual assessment of Elysian Park using the visual simulation techniques described herein would be a step in the right direction.

ANNOTATED BIBLIOGRAPHY

As with many subjects of interest for both academic and applied purposes, discovering the existing body of literature is often a matter of discovering the correct term. Such was the case in the research for this paper. The term "modeling" leads to texts concerned with either mathematical models or physical architectural models. Though many of the architectural modeling techniques may prove useful in representing future impacts, as presented in these texts the concern is salesmanship. It was the term "simulation" which led to a body of research concerning the accurate representation of future construction and the visual impacts on the natural environment. Do to the brevity of this paper and the depth of the existing literature it is hoped that this annotated bibliography will prove useful in pursuing some of these techniques as they may relate to Elysian Park.

People and Agencies Contacted about Visual Simulation

University of California at Berkeley, Environmental Simulation Laboratory (Sim Lab): (415)642-2961

Prof. Peter Bosselmann of the Sim Lab: (415)642-3028

New York Municipal Arts Society, Bill Ryan: (202)935-3960

Publications Concerning Simulation

The majority of the research and literature concerning visual simulation originates from the profession of Landscape Architecture. Due to the larger scale of the environment a landscape architect deals with in areas such as natural resource management, the applicability of different methods of visual simulation has been fairly well studied. Though the two technical handbooks, offering guidelines on the use of various visual simulation techniques are at least a decade old, the techniques offered have yet to come into extensive use or study in evaluating the built environment (Zube, Simcox, Law, 1988). Considering the task of view preservation in a natural setting surrounded by an urban environment, such as Elysian Park, the applicability of techniques offered in the following literature is immediately apparent.

Appleyard, D. et al. 1973. The Berkeley Environmental Simulation Laboratory: its use in environmental impact assessment. Working Paper 206, Institute of Urban and Regional Development, University of California at Berkeley, Berkeley, California.

In describing the goals of the environmental simulation project the author identifies several areas that point to the use of some kind of simulation as appropriate in settings and at events, such as what is likely at Elysian Park. The simulator is offered as "the most useful when it simulates remote environments - those that do not presently exist." It is also presented as a tool to be used in the environmental review process in two ways: one, "for eliciting public response" and two, "as a medium through which professional measures of environmental impact can be compared with public response." Most directly applicable to this paper is the use of the simulator in situations of view interruption, visual intrusion and changes in visual access to various areas.

Appleyard, D. and K. H. Craik. 1979. Visual simulation in environmental planning and design. Working Paper 314, Institute of Urban and Regional Development, University of California at Berkeley, Berkeley, California.

This paper reports the findings of the most extensive and elaborate simulation validation project yet undertaken. It is cited in all the other works concerning simulation. In the study a 25-minute automobile route was mapped out through the varied landscape offered in Marin County, north of San Francisco. It included housing, industrial, retail, commercial office and undeveloped lands. An extremely detailed model of the route was then constructed at a scale of 1" = 30'. Through the use of a computer driven model camera the same 25 minute route was recorded using 16 mm color film and black & white video (this is before the easy availability of color video). Volunteers were then either actually driven on the route or viewed the film or video. Along the way they were asked to respond to questions and offer adjectives about the landscape they viewed (e.g., accessible, comfortable, has busy streets and highways, has dramatic or unusually designed buildings, etc.) The correlation between the auto tour and the film was over 90% in nearly all areas and in most cases over 95%.

It is in this paper that the author presents a key distinction in the field of simulation. That is the difference between realism and validity. Validity refers to the degree that a group of people viewing a simulation will respond in the same way they would if viewing the actual landscape being simulated. Realism is the extent that a simulation may appear real. The author points out that a highly realistic simulation may in some cases fail in one or more areas in terms of validity, while a simple schematic simulation that elicits responses with a high correlation doesn't have to appear realistic at all.

Bosselmann, P., 1990. Dynamic simulation of urban environments: twenty years of environmental simulation at Berkeley. Working Paper 509, Institute of Urban and Regional Development, University of California at Berkeley, Berkeley, California.

A review of the past twenty years of work at the Sim Lab. Regretably, projects and successes are only presented in the vaguest of terms, which does not permit cross checking the outcomes and the impacts of the simulation on the decision process. It does offer some technical information about photography and simulation.

Specifically, the correct focal length lens to use to photograph simulations is 65mm on a 35mm camera which provides a viewing angle of 30 degrees. This closely approximates the center of a person's viewing area, while keeping the correct size relationship between distant objects and objects in the foreground. It is also important to maintain proper relationship between the viewer and the scene being viewed. To do this, the photo (or slide) should occupy the same portion of a viewer's field of vision as the actual view would if the viewer was standing on the site. The viewing distance can be calculated with the following equation. The distance from the lens to the film plane (in this case 65mm) multiplied by the factor of magnification of the image. The magnification factor can be derived by converting the long edge of the image to millimeters and dividing by 35mm (the length of the same side on the negative). For a jumbo print (4" x 6") pasted into a report the equation looks like this: 65 x (1524/35) = 2830mm or eleven inches. For a slide projected onto a four foot wide screen the ideal viewing distance is 7 feet 5 inches. Sheppard, in his book, presents a slightly different approach which is dependent on the viewing angle of the image which is often not known.

__, 1987. "Times Square." Places, 4(2):55-63

In presenting a brief overview of the work done by the Environmental Simulation Lab at U. C. Berkeley the author demonstrates the applicability of the Sim Lab in evaluating changes in the built environment.

Bosselmann, P., et al., 1984. Sun Wind and Comfort. Institute of Urban and Regional Development, University of California at Berkeley, Berkeley, California.

In providing a review and presentation of the analysis of four public open space sites in San Francisco concerning wind and sun, the author highlights the ability of the Sim Lab to conduct technically exacting studies using scientifically precise techniques.

Burden, E. 1985. Design Simulation. New York: John Wiley & Sons.

This is more of a picture book with examples of each of the many visual simulation techniques represented. The section on computers appears quite dated. This book does contain a very good photograph of the Sim Lab at Berkeley with the Marin County model, which gives the viewer an idea of the overwhelming size of the Sim Lab's undertaking in the validation study.

Danahy, J.W., and R. Wright. 1988. "Exploring design through 3-dimensional simulations." Landscape Architecture 78(5):64-71

A review of the work being done at the University of Toronto Simulation Lab provides a glimpse at what may be in store for planners and urban designers in the near future. Particularly interesting is the discussion of the TUUMS (Toronto University Urban Modeling System) software which allows rapid extrapolations of traditional land use control methods (zoning, height restrictions, FAR, setbacks, etc.) into three dimensional solid computer renderings. A similar technique may prove useful in evaluating impacts of proposed development in "City North" on views from and to Elysian Park.

Iverson, W.D. 1985. "And that's about the size of it: visual magnitude as a measurement of the physical landscape." Landscape Journal 4(1):14-22.

Through computer calculation of the amount of area taken up in a view frame (the limits of a particular view, often as seen in a photograph) the author suggests that impacts on the visual landscape could be regulating the numerical measurement of this "visual magnitude" from key vantage points. This is based on the commonly understood, but seldom quantified concept that some thing 10 miles away will occupy less of the view frame and thus have a lower "visual magnitude" than the same object one mile away. The measurement offered is called the SEVR (Smallest Expanse of Visual Resolution), which corresponds to the amount of the view frame occupied by a 1.5 foot square at a distance of one mile or square minutes of visual angle.

Orland, B. 1988. "Video Imaging: a powerful tool for visualization and analysis." Landscape Architecture 78(5):78-88.

In reviewing the work being done with computers and video at the Imaging Systems Laboratory, Department of Landscape Architecture at the University of Illinois at Urbanna-Champaign the author relates a use of their imaging techniques to demonstrate the

visual impacts proposed water tanks would have on a forest preserve. Computer digitizing of video images is a different technique from conventional CAD rendering, where a video image is converted to digital information and stored on a computer. Once in the computer, the image can be manipulated using such techniques as painting proposed changes on the image or creating photo montages by combining different digitized images. The author points out that these techniques are well established in the field of graphic arts and television production, but as of yet implementation of these techniques in the design professions has yet to take hold.

Sheppard, S. R. J. 1989. Visual Simulation. New York: Van Nostrand Reinhold.

The author is a firm believer in the visual simulator as an objective "scientist" and that fact is reflected throughout this book. It is very detailed and instructive about all areas of visual simulation, spelling out fundamentals and problems, principles, practical guidelines and proposing policies and professional standards for visual simulation. The area where this book goes beyond any previous work is in the technical appendixes which contain cost factors, sample worksheets and a proposed model ordinance for simulation, all of which are very useful.

__ 1983. "How credible are visual simulations?" Landscape Architecture 73(1):83.

A brief review of the authors research into the accuracy of current visual simulations reveals that "the overall accuracy was quite low. Most simulations contained pronounced differences from real views." The author goes farther than mere criticism and offers an assessment of what factors contribute to unbiased evaluations of visual simulations. The two most necessary requirements are a wide field-of-view in the simulation and accuracy in the pertinent aspects of the project, e.g., position on skylines, color contrast with setting and a moderate amount of detail.

__ 1982. "Predictive landscape portrayals: a selective research review." Landscape Journal 1(1):9-14.

As a review of simulation research, this paper identifies some gaps in the existing body of literature, while summarizing many of the findings presented in other reports cited.

Smardon, R.C., J. Palmer, J. Felleman, ed. 1986. Foundations for Visual Project Analysis. New York: John Wiley & Sons.

This is a comprehensive book bringing together work by many authors, which up until now has been scattered through many different articles in hard to find journals and conference proceedings. Several of the authors cited elsewhere in this bibliography contributed chapters to this book. It contains an extensive glossary and bibliography and serves as a good introduction into the field of visual simulation. Designed as a text book, it contains sections on the history of landscape values and perception, the basic visual process, landscape description and analysis, landscape assessment and evaluation and a review of work, throughout the world,in the field. This book should be read before Sheppard's book due to its broader focus, but both books complement each other quite well.

Zube, E. H., D. E. Simcox and C. S. Law. 1987. "Perceptual landscape simulations: history and prospect." Landscape Journal 6(1):62-80

Contains one of the most complete bibliographies found on the subject, this paper represents a comprehensive overview of all the current visual simulation techniques currently in use along with clear reference to the pertinent literature. The gaps identified in the exiting research are more clearly articulated than in Sheppard (1982)

Publications Concerning Parks, Open Space and Elysian Park

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1 Smardon, R.C., J. Palmer, J. Felleman, ed. *Foundations for Visual Project Analysis*. New York: John Wiley & Sons. 1986.

2 *Ibid.*

3 *Ibid.*

4 *Ibid.*

5 Prof. Bosselmann presented an aspect of this discussion as insiders to the park (the users) and outsiders (passers by). Each of these groups should be considered when conducting a visual assessment.

6 Sheppard, S. R. J. *Visual Simulation*. New York: Van Nostrand Reinhold. 1989.

7 A Viewshed is the geographical area able to be seen from a certain point on a site, taking into account topography, air quality, foliage, etc.. It is very similar to the concept of a watershed.

8 Iverson, W.D. "And that's about the size of it: visual magnitude as a measurement of the physical landscape." *Landscape Journal* 1985. 4(1):14-22.

9 Zube, E. H., D. E. Simcox and C. S. Law. "Perceptual landscape simulations: history and prospect." *Landscape Journal* 1987. 6(1):62-80

10 *Ibid.*

11 *Ibid.*

12 Sheppard, S. R. J. "How credible are visual simulations?" *Landscape Architecture* 1983. 73(1):83.

13 Zube, E. H., D. E. Simcox and C. S. Law.. 1987.

14 See bibliography entry under Appleyard, D. and K. H. Craik. 1979 for an explanation of the concepts of validity vs. reality.

15 Sheppard, S. R. J. 1983.

16 Appleyard, D. and K. H. Craik. 1979 contains the findings of this study and discusses in detail areas of improvement and applicability.

17 The Embarcadero Freeway was originally planned to ring the city along the waters edge. When the citizens saw the visual damage being caused by the erection of an elevated, multi-level, concrete highway blocking visual access to the bay they protested hard enough to stop the freeway. For years an incomplete and unusable section of the freeway towered over Lawrence Halprin's fountain at Embarcadero Center as testimony to the folly of undertaking large construction projects without adequate visual simulation. and public involvement.

18 Zube, E. H., D. E. Simcox and C. S. Law.. 1987.

19 *Ibid.*

20 Orland, B. "Video Imaging: a powerful tool for visualization and analysis." *Landscape Architecture* 1988. 78(5):78-88.

APPENDIX

TABLE 1 Matrix of Visual Resource Analyses: Scales, Decision Needs, Examples of Studies

SCALE	DECISION NEEDS/PROCESSES	SPECIFIC STUDIES
National Scale	·national landscape inventory/priority	Countryside Commission of Scotland (1979
Sub-National/ Regional Scale	·multiple river basin water resource planning studies	Litton and Tetlow (1978); Gerner Sanderson Faggetter Cheesman (1979)
Statewide Scale	·statewide landscape inventory for land use planning	Gordon and Shane (1978)
Regional Scale	·inventories and assessment for land use planning	Fines (1968); Zube et al. (1974)
	·for multiple resource planning for national forests	
	·river basin planning	Jones & Jones (1975, 1973); Jackson, Valesques and Harper (1977)
	·shoreline & coastal zone planning	Vineyard Open Land Foundation (1973); Chisholm et al. (1974); Roy Mann Assoc. (1975)
Town Scale Area Wide	·visual inventory & analyses for land use planning; urban renewal; urban design and image assessment	
Regional/Town Scale linear/corridor	·transportation and river planning	Appleyard, Lynch & Meyer (1964); Smardon et al. (1984)
Regional to Site	·generic impact assessment for linear and point phenomena, location and general project planning for: ∘forestry activity	Kell (1979)
	·National recreation areas	
	·coal development	Tetlow & Sheppard (1977)
	·power plants	
	·power transmission lines	Blair et al. (1976)
	·LNG off-loading terminals	Baird et al. (1979)
	·scenic river management policies	Steinitz et al. (1978)
Site/Project Scale	·Detailed visual impact assessment of alternatives in environmental assessments or E.I.S.'s. Visual mitigation for:	
	∘coal development	Wirth Assoc. (1980);
	∘quarry	Fitzgerald (1979);
	∘oil development	Cairns, W.J. & Assoc. (1974);
	∘oil pipeline/accessories	Architects Design Group (1978);
	∘power plants (nuclear refuse & coal)	Jones et al. (197); EDAW (1978); Petrich (1979 a & b)
	∘windpower generators	Wagstaff & Brady (1982);
	∘power lines	Sherer & Embree (1983);
	∘dams & reservoirs	Dougal et al. (1973); Sydney (1970); Ady et al. (1979 a & b)
	∘flood control alternatives	
	∘coastal structures & dredging	Roy Mann Assoc. (1975); Smardon et al. (1980);
	∘observatory	Univ. of Calif., Santa Cruz Angelo
	∘ski area development	Johnson (1974)
	·Visual impact assessment & mitigation for:	
	∘highways	Blair (1980); Kunit & Calhoun (1973);
	∘urban development	Bosselman (1983); Stewart (1980); Erickson (1980); Smardon (1983);
	∘port redevelopment	Blair et al. (1980, 1982);
	∘industrial redevelopment	James, Johnson & Roy (1980)
	·Project management and evaluation, long-term mitigation for:	
	∘highways	Colorado Dept. of Highways (1978); Hampe & Noe (1979);
	∘forest harvesting	Schwartz (1977);
	∘waterfall management	Int'l. Joint Commission (1975)