CHAPTER 13

VISUAL IMPACT ASSESSMENT IN URBAN ENVIRONMENTS

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INTRODUCTION

Visual impact assessment can be an important component of environmental review for urban projects. The visual appearance of a project or structure can have significant effects on immediate project users, as well as on members of surrounding communities.

On the one hand, visual appearance can contribute greatly to user satisfaction, with such tangible results as low vacancy rates, high business volumes, maintenance of capital values, and evidence of physical care.

On the other hand, good visual relationships between a project and its setting can also help to secure project acceptance from the wider public. The visual character of our buildings, streets, and open spaces has cultural meaning and can support or erode our psychological well-being (Appleyard 1976). Community appearance, like the appearance of an individual project, also translates into economics. Where there are positive visual values in an existing community or open space, the visual appearance of a project should support or complement these values, which can include sunlight and distant views as well as harmonious building design. There is much room for improvement, however, in the appearance of many urban environments; in these settings, a new project may well present an opportunity to create beneficial visual impacts (Lynch 1976).

Because visual experience is a compound of physical stimulus and psychological response, some aspects of visual impacts are undeniably subjective. However, there is evidence that broad consensus exists for many visual issues. In recent years, extensive research has been conducted on visual perceptions and values. Much of this research has focused on rural areas and wildlands, where federal land-managing agencies have been charged with stewardship of visual resources, but researchers are also paying increased attention to urban environments (Elsner and Smardon 1979; Stone 1978).

Efforts at urban visual impact assessment, however, sometimes run counter to an older tradition of architecture and urban design. In that tradition, design is considered the province of an artistic elite. Members of the elite draw on personal aesthetic systems for design principles and may interpret public opposition to their designs as symptomatic of society's long-standing failure to understand advanced art. Practitioners who would assess the visual impacts of the designers' projects may be seen as on the side of the Philistines (Blair 1980).

During the environmental review process, the potential for conflict between the design tradition and the emerging field of visual assessment may be reduced if practitioners of the latter put their emphasis on examining (1) the effects of alternatives and (2) offsite visual impacts, leaving clients and market forces to deal with the visual effects of design on project users.

VISUAL IMPACT ASSESSMENT PROCESS

Visual impacts are somewhat different from many other environmental factors because their assessment requires information on perceptions as well as on resources. To understand and assess the visual effects of a project, we must understand not only the project and its context, but also the probable responses of the people who will see it (Zube et al., 1975; also see Chapters 3, 4, and 5).

It is important to obtain information on perceptions of a given project directly from the public, whenever possible. In this chapter, we will discuss ways to obtain such information during the assessment process, which can be organized into the following steps:

1. Define the visual characteristics of the project.
2. Define the visual environment of the project.
3. Determine the visual impacts of project alternatives.
4. Evaluate those visual impacts.
5. Identify ways to mitigate significant adverse impacts.

The balance of this chapter is structured around these steps. Before going into the process, however, let us discuss some major issues for urban visual impact assessment and some of its legal underpinnings.

MAJOR ISSUES IN URBAN VISUAL IMPACT ASSESSMENT

Determining the context, or visually affected environment, of the project is a critical step that
guides subsequent visual analysis. What views and whose views will the project affect? These questions can be answered readily by using visibility analysis and mapping techniques (Chapter 4), in combination with land use and population information.

Because it is difficult to describe visual appearance in words, visual assessments of the existing environment and the consequences of project alternatives should be based on illustrations of actual views (Chapter 11). Because resources and time are always limited, it is also necessary to limit the number of views analyzed: it is essential that these be representative views, neither understating nor overstating the visual effects of the project. Viewpoint selection may be even more important to credible visual analysis than artistic sophistication. The visual consequences of a project can be illustrated by several simple but effective techniques which do not require artistic training.

The visual resources of a project site or an urban district are the stimuli upon which visual experience is based. Determination of project effects on these resources can involve several levels of analysis: a project may modify basic viewing conditions (shadow, glare, view obstruction); it may displace specific resources and replace them with others (trees, buildings, pavement); it may modify the visual character of existing resources (form, color, scale); and it may increase or decrease the overall visual quality of community views. Indicators of impact have been developed for each level, but consensus is best established for the more basic visual resource effects.

The recognition of viewer constituencies is also important in evaluating the visual impacts of a project, since these impacts are determined by perceptions as well as resources. Viewer sensitivity changes with activity, because vision is an active sense. That is, to a large extent we see what we are looking for. A direct examination of the perceptions of the people affected by a project is desirable but often difficult; land use is an example of a useful indirect indicator of likely viewer response.

Criteria for evaluating the visual relationships between a project and its setting often become more clear as the visual character of the setting becomes stronger. Many communities (Savannah, Georgia, and Lowell, Massachusetts, are two examples) have developed visual criteria for special review districts by abstracting the existing "visual vocabularies" of these districts. Once criteria for evaluating the visual impacts of a project are well determined, the effectiveness of alternative actions and mitigation strategies can also be readily evaluated.

**LEGISLATIVE, JUDICIAL, AND ADMINISTRATIVE UNDERPINNINGS**

Chapter 2 discussed the legal basis for incorporating aesthetic considerations in land use decisions, including the National Environmental Policy Act (NEPA) and the state environmental policy acts (SEPA). That chapter also touched on the zoning and design review ordinances that have long been the vehicles for incorporating visual considerations into local government decision making.

Chapter 2 also covered federal administrative regulations for the implementation of NEPA. There are other federal regulations that deal with visual impacts in the urban environment. Perhaps the most relevant to urban programs and projects are the regulations that implement the Historic Preservation Act of 1966. Section 106 of the Act requires the consideration of project effects on any district, site, building, or object that is included in the National Register, or that is eligible for future inclusion. The implementing regulations define "criteria of adverse effect" to include visual elements "that are out of character with the property or alter its setting."

Various state environment policy act (SEPA) regulations and guidelines also require assessment of visual effects. To comply with these requirements, some local governments have adopted policies or regulations setting out the basis on which visual effects will be evaluated. For example, the City of Seattle has adopted specific policies on the disclosure and mitigation of view obstruction, shadow, and light and glare effects. Local design review procedures, such as those of Claremont, California, may also provide guidance for identifying and weighing visual impacts.

In the courts, the case law of urban aesthetics is predominantly concerned with zoning, billboards, junkyards, and urban renewal. In 1954, in the landmark case of Berman v. Parker, the U.S. Supreme Court upheld the use of eminent domain for aesthetic purposes, affirming that "it is within
the power of the legislature to determine that the community should be beautiful as well as healthy." More recently, the courts have begun to receive cases stemming from the environmental legislation of the 1970s. In 1978, the U.S. Supreme Court affirmed a New York City rejection of a 53-story addition to Grand Central Station because of the adverse visual impacts on that historic landmark. In the same year, the Washington State Supreme Court affirmed a decision by the Building Superintendent of the City of Seattle denying a building permit because of visual impacts disclosed in an environmental impact statement (EIS). These and other decisions have confirmed that urban aesthetics is a legitimate concern of government and that visual considerations—if clearly stated and analyzed—can be incorporated into government decisions without violating fundamental personal and property rights (Brace 1980).

DEFINING THE VISUAL CHARACTERISTICS OF THE PROJECT

Although project design is usually schematic at the EIS stage, it is possible to determine basic visual impacts if the project submittal clearly identifies the primary visual characteristics of the project. In short, what will the project look like? Local codes often spell out submittal requirements, but it may be useful to briefly discuss these primary visual characteristics under three headings:

- Structures.
- Site improvements.
- Uses.

Structures

Enough information should be provided to determine the location, dimensions, form, and exterior materials of principal and accessory structures.

With regard to location, it is particularly important to know the relation of proposed structures to existing site features. This information is not always provided as a matter of course and may have to be specifically requested or determined.

Project drawings usually give the basic dimensions of structures, but often omit the details of certain features that may have visual importance. These include roof configurations, stair towers,
FIGURE 13.2. Plan of project shown in Figure 13.1, indicating relation to existing structure and streetscape. Source: Preuss-Kovell International, Architects and Planners, Seattle, Washington.

and mechanical penthouses, as well as accessory structures such as fences and service or utility enclosures.

The elevation drawings of structures should include all doors, windows, projections, and balconies to indicate the form and relative scale of structures. These drawings should also indicate the reflectivity, color, and texture of exterior surfaces (see Figure 13.1).

Site Improvements

Information on the project site should include existing visual resources as well as proposed con-
ditions, to allow determination of the onsite effects of visual change and the integration of proposed improvements with existing resources. Written or drawn information should be supplemented by photographs of any notable existing features. The location of these photographs should be indicated on a site plan.

Landform information should include any special features such as rock outcroppings, as well as proposed grading and slope retention structures. Information on water features should include existing and proposed drainageways and surface water features, such as swales, wetlands, streams, and stormwater retention facilities. Vegetation data should include any mature trees or attractive native vegetation, as well as proposed planting.

Site information should also include existing structures, such as principal buildings, outbuildings, fences, walls, walkways, bridges, and other structures (see Figure 13.2). Special notice should be made of any man-made features that are historic, architecturally distinctive, attractive, or that reinforce regional visual character. Circulation and utilities should also be disclosed, including existing and proposed paths, roadways, parking areas, lighting, overhead utilities, transformers, pumping stations, and other utilities.

Uses

Uses intended for the project structures and site may require ancillary facilities and may have oth-

**FIGURE 13.3.** Project open space that is available for public use. Source: TRA, Architects and Planners, Seattle, Washington.
er visual implications. Certain uses may attract viewers onto the site; other uses may usually be considered unsightly by project neighbors.

Project information should therefore identify any public uses, including play areas, playfields, display gardens, sunning areas, public art, viewpoints, paths, and trails (see Figure 13.3). Private or semiprivate uses should also be identified. These may include garden plots, patios, play areas, laundry, outdoor storage, and vehicle maintenance areas. Service uses may pose visual issues on some projects. Such uses include repair, maintenance, storage, delivery, and refuse collection and disposal.

Physical facilities may be associated with any of the preceding types of uses. These facilities could include site furnishings, outdoor art, play equipment, lighting, screening, fencing, or other enclosures.

In summary, project information must be carefully reviewed to make sure that all the principal visual characteristics of the project are defined and disclosed. In the author's experience, important items of information are usually missing. In fact, it has sometimes seemed that visual impact assessment is one of the best vehicles in the environmental review process for tying down the often-elusive "project description."

DEFINING THE AFFECTED VISUAL ENVIRONMENT

The visual relationships between a project and its setting are the key to the visual impacts of the project on that setting. This is the subject on which many community concerns focus. Information on these visual relationships is central to visual impact assessment and is increasingly required by local governments for environmental clearances and approvals under planned unit development ordinances, coastal zone management programs, and similar planning mechanisms.

The critical questions include: "What is the viewshef of the project?" "Whose views will be affected?" "What are the existing characteristics of these views?" and "Which views of the project will be most important in establishing its impact?" The answers are commonly found in three sources:

- Project information.
- Existing documentation.
- Field observations.

Project Information

Information in project applications and environmental documents should establish the visual context of the project and identify the major offsite viewing groups and their probable responses. While prediction of those responses may be possible, even better information is obtained if the project sponsor accommodates public involvement in the preparation of the EIS and if visual issues are explored in the involvement program. Citizens steeped in community history and values may be able to identify visually important features and views as well as, or better than, outside experts. Given this perspective, the information required from the sponsor should include the following types of data:

1. The visibility of the project: the areas from which the project will be seen (its viewshef) and any topography or tree cover that restricts visibility (Felleman 1982).
2. Project viewers (offsite): types, location, numbers, duration, and viewer activity (land use is an indication).
3. Visual characteristics of the immediate project setting, including any major views, important features, or eyesores.
4. Key views of the site and its setting from locations in the surrounding environment that are representative of the public and private viewpoints from which major viewing groups will actually see the project; these views should be illustrated by a limited number of photographs keyed to a plan and related to the analysis of project viewers (Blair, Walters, and Mah 1982).
5. Simulations of the visual appearance of the project in key views; these simulations should accurately illustrate both the project and its setting (Sheppard 1982b).

EXAMPLE: Key View Selection, Expert Analysis

Key views were selected for assessing the visual impacts of a controversial highrise project by (1) mapping the urban districts adjoining the project site (see Figure 13.4), (2) mapping the project viewshef (see Figure 13.5), (3) overlaying the first two maps to define visual assessment units, (see Figure 13.6), (4) selecting key views from a number of candidate views representing the assessment units (see Figure
FIGURE 13.4. Urban districts adjoining project site. Source: Jones and Jones, Seattle, Washington.

FIGURE 13.5. Project viewshed. Source: Jones and Jones, Seattle, Washington.
FIGURE 13.6. Project visual assessment units. Source: Jones and Jones, Seattle, Washington.

FIGURE 13.7. Location of candidate views and key views. Source: Jones and Jones, Seattle, Washington.
13.7). The criteria for selection of the key views were:

- Inclusion of at least one view for each of the assessment units.
- Inclusion of foreground features characteristic of each assessment unit or important in that unit.
- Inclusion of background features characteristic of views toward the project from each unit.
- Complete disclosure of the appearance of the external features of the project.

EXAMPLE: Key View Selection, Public Involvement

When a project is extremely controversial, project opponents frequently challenge the key views selected by experts, charging that the selection favors the project or fails to disclose adverse visual impacts. This possibility was a concern for a visual assessment of a proposed marine terminal in Seattle.

A related concern was that the city had formally designated a large number of viewpoints for visual

### TABLE 13.1 Public Responses to Candidate Views

<table>
<thead>
<tr>
<th>RANK</th>
<th>CANDIDATE VIEW</th>
<th>MEAN IMPORTANCE Day</th>
<th>MEAN IMPORTANCE Night</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Magnolia Bridge, westend</td>
<td>4.3</td>
<td>4.2</td>
<td>Key view (day)</td>
</tr>
<tr>
<td>2</td>
<td>Magnolia Way, to downtown</td>
<td>4.3</td>
<td>4.3</td>
<td>Similar to Magnolia Bridge</td>
</tr>
<tr>
<td>3</td>
<td>8th &amp; Lee</td>
<td>4.3</td>
<td>4.4</td>
<td>Key view (day)</td>
</tr>
<tr>
<td>4</td>
<td>Kinnear Park</td>
<td>4.2</td>
<td>4.0</td>
<td>Similar to 8th &amp; Lee</td>
</tr>
<tr>
<td>5</td>
<td>Magnolia Way, to Queen Anne</td>
<td>4.1</td>
<td>3.9</td>
<td>Key view (day and night)</td>
</tr>
<tr>
<td>6</td>
<td>21st &amp; Halladay</td>
<td>4.1</td>
<td>4.0</td>
<td>Similar to 24th &amp; Halladay (which is technically better for simulation)</td>
</tr>
<tr>
<td>7</td>
<td>Smith Cove Park</td>
<td>3.9</td>
<td>3.4</td>
<td>Similar to Magnolia Bridge</td>
</tr>
<tr>
<td>8</td>
<td>24th &amp; Halladay</td>
<td>3.9</td>
<td>3.8</td>
<td>Key view (day and night)</td>
</tr>
<tr>
<td>9</td>
<td>9th &amp; Highland</td>
<td>3.8</td>
<td>3.9</td>
<td>Key view (night)</td>
</tr>
<tr>
<td>10</td>
<td>Soundview Terrace</td>
<td>3.7</td>
<td>3.8</td>
<td>Similar to 12th &amp; Raye (which is better for simulation)</td>
</tr>
<tr>
<td>11</td>
<td>27th &amp; Smith</td>
<td>3.6</td>
<td>3.6</td>
<td>Too little of site in view</td>
</tr>
<tr>
<td>12</td>
<td>Betty Bowen Viewpoint</td>
<td>3.5</td>
<td>3.6</td>
<td>Similar to 8th &amp; Lee</td>
</tr>
<tr>
<td>13</td>
<td>Magnolia Bridge, center</td>
<td>3.4</td>
<td>3.3</td>
<td>Similar to Magnolia Way, to Queen Anne</td>
</tr>
<tr>
<td>14</td>
<td>12th &amp; Raye</td>
<td>3.3</td>
<td>3.2</td>
<td>Key view (day)</td>
</tr>
<tr>
<td>15</td>
<td>Magnolia</td>
<td>3.3</td>
<td>-</td>
<td>Too little site in view</td>
</tr>
<tr>
<td>16</td>
<td>Space Needle</td>
<td>3.2</td>
<td>-</td>
<td>Too far away</td>
</tr>
<tr>
<td>17</td>
<td>Myrtle Edwards Park</td>
<td>2.9</td>
<td>3.0</td>
<td>Too far away</td>
</tr>
<tr>
<td>18</td>
<td>25th &amp; Fulton</td>
<td>2.7</td>
<td>3.1</td>
<td>Too little site in view</td>
</tr>
<tr>
<td>19</td>
<td>8th &amp; Galer</td>
<td>2.6</td>
<td>2.9</td>
<td>Too little site in view</td>
</tr>
<tr>
<td>20</td>
<td>26th &amp; Newton</td>
<td>2.3</td>
<td>2.4</td>
<td>Too little site in view</td>
</tr>
<tr>
<td>21</td>
<td>5th &amp; Mercer</td>
<td>2.3</td>
<td>-</td>
<td>Too far away</td>
</tr>
<tr>
<td>22</td>
<td>Hamilton Viewpoint</td>
<td>2.2</td>
<td>2.5</td>
<td>Too far away</td>
</tr>
<tr>
<td>23</td>
<td>Perry</td>
<td>2.2</td>
<td>2.4</td>
<td>Too far away</td>
</tr>
<tr>
<td>24</td>
<td>Waterfront Park</td>
<td>1.9</td>
<td>2.1</td>
<td>Too far away</td>
</tr>
</tbody>
</table>

*Source: Jones and Jones, Seattle, Washington.*

For assessment purposes, inclusion of all these in the assessment would have been cumbersome and also redundant, since many would be only slightly affected by the project.

The complete set of candidate views (including both day and night views) was shown to the public during the scoping meetings for the EIS (see Figure 13.8). Participants in the meetings were asked to score the visual importance of each view, defined as "the degree of consideration that should be given to possible changes in this view when examining alternatives for the (project) site." The mean scores were calculated for each view and the views were ranked in order of relative importance.

The final key views were selected from among the top-ranked candidate views, taking care to include views that showed all portions of the site and that represented major view types and major viewer groups. The accompanying table (see Table 13.1) lists the views in descending order of importance (daytime scores). It also indicates which views were selected as key views and why some views with high scores were not selected (Blair, Robertson, and Dingfield 1982).
Chapter 11 discusses simulation techniques in considerable detail. Here, we note that simulations may be dynamic (film, video) or static. The greatest equivalence of response is achieved with dynamic simulations prepared with the aid of large three-dimensional models such as those constructed by the Berkeley Environmental Simulation Laboratory (see Figure 13.12). Static simulations may be quite adequate when the project to be assessed is a point feature (such as a building) and the sensitive viewpoints are themselves static—such as residences.

A number of graphic techniques may be employed, usually working from a photographic base. An artist's color "rendering" will provide the most realistic looking simulation, but can be costly (see Figure 13.11). A simple but effective technique is to superimpose the outline of project structures on a photograph of a key view (see Figure 13.10); this is particularly useful if the issue is view obstruction rather than the visual character or quality of the project itself. For some projects "story poles" have been erected on site to indicate the position and height of structures and to simplify the establishment of accurate perspectives. Weather balloons can serve the same purpose (see Figure 13.9).

**Existing Documentation**

The nature of regional visual resources and the value attached to views of these resources can be important background information for assessing the visual effects of a project. Regional planning studies, architectural guidebooks, and historic surveys will often provide this perspective. At a more detailed level, urban inventories and community plans may identify specific areas or features valued locally for their visual appearance.

If available and if they relate to the project site and its setting, the following types of information are useful:
Distinctive regional visual characteristics, including landform, water, vegetation, and structures.

Adjacent urban districts or neighborhoods, their visual characteristics, and boundaries.

Important visual resources in the immediate vicinity, such as parks, landmarks, historic structures, and public art.

Viewpoints, including major travel routes, scenic routes, recreation areas, and residential areas.

Field Observations

Field observations are often needed to test the adequacy of project information on views, visual resources, and viewers. Reviewers of environmental documents can check the following points by walking the project neighborhood and taking a brief photographic record:

Existing visual resources on the site and in the project setting.

Viewers: their types, relative numbers, activities, responses.

Available views from the project, to the project, and other important local views.

Representative viewpoints and key views of the project site.

DETERMINING VISUAL IMPACTS

The initial determination of the types and probable degree of visual impacts can be made directly from the information provided by the project proposal, documentation review, and field observations.

This section identifies situations in which specific visual impacts are likely and also identifies the information that should be developed when
supplementary analysis is needed. Detailed descriptions of the techniques for such analysis are referenced throughout this chapter as well as chapter 12.

**Viewing Conditions**

A project may affect the amount and character of ambient light by casting shadows, creating solar glare, or introducing intense artificial light into residential areas. In turn, these effects may cause visual discomfort or interfere with activities such as driving. If one or more of the following effects is likely, information about neighboring uses and viewers will be needed to help determine the impact magnitude.

**Shadow**

Shadows cast by project structures may interfere with views and outdoor activity on neighboring sites. Shadow impacts are generally confined to areas northeast, north, or northwest of project structures. The likelihood of offsite shadows increases with latitude, the height and bulk of structures, and the proximity of structures to the north property line. The location and length of shadows changes with the season and time of day. They are longest on the winter solstice, December 21; at 10 A.M. on that day, the shadow of a structure will be two to four times as long as its height, depending on the latitude.

Because of limited shadow length, offsite shadow impacts are generally not significant for structures three stories (30 feet) or less in height. If offsite shadows appear probable for a taller structure and could fall on other structures or public use areas, the actual shadow pattern should be determined for the "heating season." This is the period including the autumn equinox, the winter solstice, and the spring equinox. The shadows on these three dates can be projected on a plan of the site and adjacent areas, using the sun's azimuth and altitude at 10 A.M., noon, and 2 P.M., the four-hour period of maximum daily solar radiation. This will establish the extent, location, and duration of offsite shadow impacts (see Figure 13.13).

Techniques for shadow projections are discussed in architectural drafting texts and handbooks such as *Graphic Standards*. An alternative approach is to simulate shadow patterns with building models (see Figure 13.14); *The Archi-

**Solar Glare**

Sunlight reflected from structures faced with highly polished or mirror-like materials may interfere with activities dependent on vision and make vision itself uncomfortable.

Glare from reflected sunlight is most likely whenever the altitude of the sun is below 30°. This generally includes the morning and evening hours, but the potential for solar glare may extend throughout the winter day in higher latitudes. The location of solar glare impacts depends on the orientation of reflective surfaces as well as on sun position, and these impacts can occur in any compass direction.

If the exterior materials of proposed structures make offsite solar glare appear probable and other structures, public use areas, major streets, or highways are located within 400 feet, actual glare patterns can be determined by geometric analysis. These patterns can be mapped on a plan of the site and its environs for the hours during the equinoxes and solstices when the sun's altitude
is below 30°. The extent, location, and duration of offsite impacts during the rest of the year can then be interpreted from the glare patterns on these days.

An article in Environmental Comment (Erickson 1980) demonstrates the potential severity of glare problems due to reflective building materials (see Figure 13.15).

**Artificial Light**

Bright lighting installations can intrude on nighttime views, cause visual discomfort, and even interfere with sleep patterns if the light sources themselves are visible.

Extensive nighttime lighting is often associated with proposals for industrial facilities, highways, large parking lots, playing fields, and institutions that operate late at night, such as hospitals and fire stations. Factors that contribute to the likelihood of offsite impacts from artificial lighting include the number of sources, source intensity (over 250 watts), mounting height (over 30 feet), and hours of operation (after midnight).

If offsite lighting effects appear probable and residential areas, major streets, or highways are located within 400 feet, a detailed lighting analysis may be necessary. The most important product of this analysis would be a plan or map of the area in which the sources that emit light would be directly visible. This area is determined by the “cutoff angle” of the fixtures that house the sources, the angles at which the fixtures are aimed, and any shielding that is added to the fixtures.

If artificial lighting appears to be a major proj-
ect issue, it may be necessary to develop a full mathematical projection of light intensity levels. This type of analysis is usually performed by an illumination engineer. It is also possible to simulate artificial lighting by means of retouched nighttime photographs (see Figure 13.16), using photos of comparable existing light systems as models (Blair, Robertson, and Dingfield 1982).

Site and Environs

This class of visual impacts results from the interaction between (1) the existing visual characteristics of the site and its environs, and (2) the visual characteristics of project alternatives. It includes effects on existing visual resources, view obstruction, visual contrast, and visual quality.

Existing Visual Resources

Complete or partial displacement of existing site features may have adverse visual effects if these features are valued for their visual appearance.

Existing visual resources may include site landform, water, vegetation, and structures. If an existing feature is recognized for some nonvisual characteristic such as rarity, scientific value, or historic meaning, the value of its visual appearance is usually enhanced. This recognition may occur at national, state, or local levels and is often documented by official means such as inclusion in a register. Official recognition may be accompanied by policies or regulations that protect the existing visual appearance of the feature and its setting (Federal Highway Adm. 1981).

The probable visual importance of existing site resources should be confirmed during field observations. If any existing resources are likely to be valued for their visual appearance, these resources should be located on a site plan. The plan should also indicate whether and to what degree these resources would be displaced by the project or integrated with it.

View Obstruction

Proposed structures or vegetation may cause view obstruction if existing middle-distance or long-distance views are available from the site or its environs and the project is located within the sightlines of these views. Obstruction of views of landmarks or other notable visual features may also constitute a visual impact, whatever the viewing distance (Parke 1966).

Unless a specific feature is involved, view obstruction generally does not become an issue until existing views extend to the middleground (1/4 to 3 miles) or background (greater than 3 miles). The lateral extent of distant views is also impor-
tant. Views that fill or exceed the entire human field of vision, approximately 150°, are generally termed “panoramic” and are most highly valued. The content of distant views can further increase their importance: water, natural features, man-made landmarks, and urban skylines composed of highrise structures are particularly valued.

The existence of important views and the location of viewpints can best and most reliably be determined from field observations. If there is a likelihood that project structures or vegetation could seriously obstruct important existing views from public parks, residences, or other view-related use areas, a more detailed analysis can be performed. It could determine the location of obstructed views, the proportion of the middleground or background that would be obstructed, and the identity of any specific features that would be blocked out. The number of viewers affected can also be estimated and the nature of the obstruction can be illustrated by superimposing an outline of the project on photographs taken from key viewpoints (see Figure 13.10).

Visual Contrast

Strong contrast between the visual character of a project and that of its setting is an important indicator of potential visual impact (Appleyard and Fishman 1977). Contrast does not always have adverse visual effects, however; the evaluation of contrast is discussed later in this chapter.

Important aspects of visual character include form (the height, bulk, and shape of structures), line (setbacks, roof lines, floor and window levels), color and texture (structure materials, site improvements), scale or apparent size (plant materials and details of structures), proportion (the relationships between horizontal and vertical dimensions), and rhythm (the spacing of repeated elements).

The visual character of the project can be identified in project analysis; analysis of environmental context will reveal the visual character of its setting. If contrast is likely to be strong, a more detailed analysis can be based on accurate simulations of the project and its environs from representative viewpoints, preferably prepared from photographs, to illustrate the degree of contrast that is probable under actual viewing conditions. See Figure 13.17 for an example of a project that is widely felt to be in excessive contrast with its surroundings. A recent book, Architecture In Context (Brolin 1980), is largely concerned with the issue of contrast between historic structures and new buildings.

To supplement expert analysis, public involvement techniques may be used to help rate contrast. A principal difficulty with the use of direct public involvement in urban visual assessment is that feelings frequently run high. Therefore agencies and clients often fear that public response sessions will be “packed” by project opponents. This problem can be overcome by carefully designed sampling strategies, but such strategies are usually rather costly.

Visual Quality

A public project will usually be seen as one element in a larger visual setting. Therefore it should enhance or improve the visual quality of its environs, rather than diminish that quality.

Project effects on visual quality are particularly likely to be an issue in settings that are already recognized for their visual quality (designated scenic areas and viewpoints, natural areas, parks, design review districts, and historic areas). However, many other settings have visual qualities—picturesque architecture, mature trees, distant views—that are attractive and that encourage development. The visual quality of this development can be a very significant factor in whether such areas will continue to garner new investment. Underutilized urban shorelines, warehouse districts, and traditional small-town main streets
are examples of settings where visually sensitive projects can make a critical difference in the economic future of an area.

Visual quality is difficult to evaluate from plans and elevations because it is based on three-dimensional visual relationships between a project and its environs. Nevertheless, when project plans are combined with field observations, reviewers can make an initial determination of likely visual quality effects. Research has confirmed that the general public regards certain project features as attractive in themselves (street trees, materials such as brick or stone), but regards other features as unattractive (parking, utilities, and refuse storage). The relative visibility of these features from the project surroundings is therefore a basic indicator of likely visual quality. Another is evidence of integration of the design arts in the proposed structures and exterior spaces: architectural detailing, site planting, play areas, viewpoints, sculpture, earthworks, site interpretation, and so on.

If visual quality appears likely to be an important issue, a complete analysis will require accurate illustrations of the project and its environs from representative viewpoints, as discussed earlier. Expert appraisals of these views can be acceptable surrogates for public opinion if the appraisals are based on well-defined criteria derived from research into viewer response. For example (Blair 1980), experts can use dimensions such as the following to assess visual quality and prescribe mitigation measures:

The vividness or memorability of views that include the project.

The presence of a visually recognizable order, man-made or natural, in these views and their freedom from elements encroaching on that order.

The visual unity or compositional harmony of all the elements in these views.

In urban settings with many viewers, however, members of the public will freely volunteer opinions on visual quality. Further, John Costonis notes that the appropriate legal test may be the reaction of “the man in the street,” rather than the opinion of the specially educated connoisseur. In this situation, expert opinion may be discounted and it may be more important to select representative views and prepare accurate and credible simulations that can “speak for themselves” (Costonis 1982).

On the other hand, it is also important to note that many communities have formally delegated aesthetic decision-making powers to experts. Thus the visual quality of the University of Washington is in the hands of the Campus Design Commission, and the visual quality of certain classes of private development in the City of Bellevue is subject to administrative design review by staff of the Planning Department.

EXAMPLE: Determination of Visual Impacts, Public Involvement

Plans for construction of a state highway across a lake in Shreveport, Louisiana, had been held up by court battles for many years. The issues were gradually narrowed to the relative visual impact of alternative routes on the lake and adjoining recreation lands.

Opposing expert witnesses had reached a standoff in courtroom testimony on these impacts. It appeared that the only way to reach a definite determination of the relative visual impacts would be to elicit public response to the alternatives. The highway agency was reluctant to do this because the community was so polarized over the project. Finally, however, the agency decided to try a public involvement program because of the enormous cost of further delay.

To ensure that participants in the response program were representative of the community as a whole, a rigorous sampling program was set up. Major viewer groups were distinguished on the basis of geographic location, because viewer exposure factors such as distance from the highway alternatives and angle of view were thought likely to affect viewer response. Another consideration that entered into the delineation of viewer groups was the minimum population size necessary to achieve statistical reliability.

Within the general project viewshed, seven groups of residential viewers were distinguished on the basis of their potential exposure to the alternatives (see Figure 13.18). The recruitment goal for participation in the response sessions was a randomly drawn sample of 20 persons from each of the seven residential groups. Each of the dwelling units within the seven areas was assigned a sequential
number. A random number program was then used to identify persons within each area; these people were contacted and their participation solicited until the quota for each area was met.

Responses were elicited in a series of small-group sessions (see Figure 13.19); in each, the participants viewed a series of film clips that simulated views of the highway and trips along it. The simulated views were divided into randomly ordered groups in which the participants were unlikely to be able to recognize "their" views, and into clearly organized presentations of the alternatives (Atkins and Blair 1983).

The results of the public response sessions appeared to show that the visual resource effects of the alternatives were roughly equivalent, but that one set of alternatives would expose roughly 10 times as many viewers to these resource effects as would the other alternative. Not surprisingly, the participants favored the low-exposure route by an overwhelming margin. This had never come out clearly before because the number of vocal spokespersons for each alternative was approximately equal.

EVALUATION OF VISUAL IMPACTS

Criteria

The evaluation of visual impacts cannot be reduced to a simple formula. Consideration must be given to all the types of visual effects discussed in the previous section, but there is no universal way of weighing these considerations against each other. In one case, a significant change and contrast in visual character may be acceptable if a
project helps to improve the overall visual quality of its surroundings. In another case, a project may be visually unacceptable because of the level of effect on a single consideration, such as view obstruction.

The project setting or existing features on the project site may trigger specific evaluation criteria in federal, state, or local laws and regulations. If so, these criteria must be addressed explicitly in the project EIS. Examples of such instances include the following:

1. **Shadow.** State environmental policy acts or local ordinances may control the extent of shadows that project structures cast on public areas offsite; other state or local legislation may control shadows indirectly, by protecting the solar access of existing structures adjoining the project site.

2. **Solar glare.** State and local environmental regulations may address offsite glare and heat gain from reflective project surfaces; such agencies as the Federal Highway Administration may be concerned with the safety effects of solar glare on drivers traveling high-speed freeways.

3. **Artificial light.** High-intensity lighting may be regulated in circumstances similar to those created by solar glare.

4. **Existing visual resources.** If site features are designated in federal, state, or local registers (or are eligible for designation), the project EIS must assess the visual effect of removing or modifying these features; other provisions, such as local tree protection ordinances, may also direct the assessment of effects on specific visual resources.

5. **View obstruction.** Views from public viewpoints or views of certain landmarks may be protected by means such as zoning codes, coastal management programs, or even scenic easements, as well as by environmental impact disclosure requirements.

6. **Visual contrast.** Legislation and regulatory programs commonly seek to minimize the introduction of visual contrast in areas valued for their existing visual character, such as historic districts, design review districts, and scenic rivers. In some cases, the evaluation of contrast may be intended to avoid the difficulties of evaluating visual quality directly.

7. **Visual quality.** The National Environmental Policy Act takes a direct approach to maintaining and enhancing all aspects of environmental quality, including visual quality. Several federal agencies with responsibilities in urban areas require the explicit evaluation and management of project effects on visual quality. Among these are the Federal Highway Administration, the Department of Housing and Urban Development, and the Soil Conservation Service. Further, many local communities have design
commissions or design review boards that try to maintain or enhance the quality of portions of the urban environment.

Significance

Factual information on the degree of effect is essential as a basis for evaluation of the significance of effect. In addition to the information on specific visual stimulus issues discussed earlier, evaluations of significance should also consider viewer response issues such as the types and numbers of viewers who will see the project onsite and offsite, and their perceptions and concerns. Thus the visual effects of projects must be evaluated in relation to both the visual setting of the project and the people who will see it. Whenever possible, evaluation should also be based on accurate (although not necessarily detailed) visual representations of the project in its setting.

The decision of “how much is too much” often must be based on local values and precedents. Once again, direct readings of viewer response provide extremely useful information for project evaluation and can help to corroborate expert judgments, particularly in adversary situations. Visual effects may be classified into five levels of significance:

- Beneficial.
- Acceptable.
- Acceptable with mitigation.
- Unacceptable.
- Indeterminate.

1. The visual impacts of the project may be evaluated as beneficial if the appearance of the project evidences careful design and support of project functions, and if it complements the visual character of its setting or improves its visual quality.

2. The visual impacts of the project may be considered acceptable if there is reason to believe there will be no significant adverse visual effects onsite or offsite.

3. Visual impacts may be evaluated as acceptable with mitigation if there will be one or more significant adverse effects, but these can be eliminated, reduced, or offset to a major extent by specific mitigation measures.

4. Major adverse visual effects, onsite or offsite, that cannot be appreciably mitigated may compel an evaluation of the project’s visual impacts as unacceptable.

5. If it appears that significant adverse visual effects are likely, but the extent to which they may occur and/or to which they may be mitigated cannot be determined, the visual impacts of the project may be rated as indeterminate. In this case, the specific visual effects at issue can be identified for more detailed study.

MITIGATION MEASURES

Mitigation measures for adverse visual impacts can transcend "cosmetics" if they address specific effects rather than dress up general project appearance. Each proposed mitigation measure should be clearly and logically related to the particular visual problem it is intended to correct. The degree to which the measure will correct the problem can also be identified. EIS reviewers, including members of the concerned public, may justifiably be suspicious of vaguely stated visual mitigation strategies.

Specific Measures

The following measures are examples of the types of actions that may help to mitigate adverse visual effects, grouped by categories of visual considerations:

1. Shadow. Reduce extent and duration of shadow impacts by modifying siting or orientation of structures and reducing their height or bulk.

2. Solar glare. Reduce extent and intensity of glare by reducing extent of reflective materials, reducing their reflectivity, and adjusting their vertical and horizontal orientation.

3. Artificial lighting. Reduce extent, intensity, and duration of lighting impacts by reducing number of fixtures, reducing source intensity, lowering fixture mounting height, providing source shielding, modifying fixture aiming, or limiting hours of operation.

4. Existing visual resources. Reduce impact on existing features valued for their visual appearance by retaining all or part of these features onsite, integrating these features into project de-
sign, relocating or salvaging the features, or providing interpretive materials about the features.

5. View obstruction. Reduce interference with offsite views by modifying placement, height, and shape of structures, including rooftop mechanical equipment and enclosures.

6. Visual contrast. When excessive visual contrast is an issue, reduce it by modifying spatial disposition of structures (setbacks, rhythm, and site coverage); modifying height, bulk, shape, and proportion of structures; manipulating visual scale (projections, doors and windows, materials); incorporating materials, textures, colors, and architectural details from the environs.

7. Visual quality. To increase the visual quality of the project and its setting, modify placement, height, form, and proportion of structures in relation to adjoining development and existing views; unify project with setting by plant materials, site furnishings, lighting, and paving; provide public activity space and/or viewing onsite; integrate design arts into project planning.
Part five presents three contributions from international authors: a report from Yugoslavia focusing on visual quality as an issue in urban planning; the second a report from Sweden of recent results from one of the oldest and most active environmental visual simulation laboratories; and finally a description of a comprehensive system for evaluating landscape visual quality used in Spain. At one time, consideration was given to including these contributions in their respective thematic parts. However, they have been collected together as a part of their own to illustrate the variety of state-of-the-art performance from other parts of the world. The United States is a large country and very active in the area of environmental protection. It is therefore only too easy for Americans to become smug in our own efforts and fail to appreciate the significant advances being made elsewhere. For instance, we should make it a habit to review the foreign journals that address issues of concern to our field. Those with texts in English include: Landscape Australia, *Garten und Landschaft* (Germany), *Landscape Planning* (International), *Anthos* (Switzerland), and *Landscape Research* (United Kingdom).

This section begins with Pogačnik’s description of a geographic database that incorporates visual as well as other landscape planning dimensions. It is applied to Ljubljana, Yugoslavia, for the purpose of developing visually sensitive project siting criteria. His outlook for integrating aesthetic and visual concerns within the planning
and design process is very much in harmony with the intent of NEPA.

Janssens and Küllner, in Chapter 15, describe the genesis of the environmental visual simulator at Lund, Sweden. Their report pays particular attention to the comparative efficacy of various representational techniques. Their simulation lab continues to be involved in helping designers and the general public to visualize the environmental implications of proposed projects. It should serve as a standard for others to emulate.

Finally, Alonso, Aguilo, and Ramos, from Spain, present a visual impact assessment procedure that seeks to optimize three considerations: visibility, visual quality, and fragility. Their work is particularly characterized by the careful articulation of a great many measured landscape parameters. The use of this procedure is illustrated through the siting of an industrial facility.