Appendix J
Visual Resources Technical Report

Southwest Light Rail Transit (Metro Green Line Extension) Supplemental Draft Environmental Impact Statement
Visual Resources Technical Report

November 2014

Prepared by

CH2MHILL

Contents

Tables

Attachment J-1.1. Visual Resources Exhibits

Eden Prairie Segment

St. Louis Park/Minneapolis Segment

Attachment J-2. Federal Highway Administration - Visual Impact Assessment for Highway Projects

APPENDIX J

1. Introduction

A Draft Environmental Impact Study (EIS) for the Southwest Light Rail Transit (METRO Green Line Extension) (referred to herein as Southwest LRT or the project) was published in October 2012. Since then, some substantial modifications have been made in the proposed light rail-related improvements and freight rail modifications that are a part of the Locally Preferred Alternative (LPA). In the Eden Prairie study area, adjustments have been made to the locations of two proposed light rail stations and the light rail alignments that would connect to them. In the St. Louis Park/Minneapolis study area, a segment of the LPA that was originally proposed for development at-grade would be placed in a light rail tunnel located in the area between the proposed West Lake Station and the Kenilworth Lagoon. This technical report documents the existing visual conditions and the project-related visual impacts within the Eden Prairie and St. Louis Park/ Minneapolis Segments of the route.

The proposed location of the Operations and Maintenance Facility (OMF) has also been proposed to be located in an industrial area in Hopkins. Because this facility is located in an industrial area where there are no sensitive views, the visual impacts in this area would be generally not substantial. Consequently, the proposed OMF area was not evaluated as a part of this analysis.

In addition to the light rail-related improvements and freight rail modifications described above, the LPA will also include TPSS facilities. The specific locations for TPSS's have not been defined; however, siting of these facilities will be determined by utilizing fully developed areas, including surface parking lots, existing roadway right-of-way, and vacant parcels where feasible. The potential mitigation strategies referenced below to minimize adverse visual impacts would also apply to the TPSS facilities.

This visual resources analysis was prepared using the systematic procedure described in Section 2, Analysis Approach. It identifies both long-term and short-term (construction-related) impacts that the LPA would have on visual quality, including potential impacts to sensitive user groups in the Eden Prairie and St. Louis Park/Minneapolis areas. This analysis also identifies potential mitigation strategies to minimize impacts.

2. Analysis Approach

A. Background

The visual quality and aesthetics assessment in Section 3.6 of the Draft EIS was based on a project-specific methodology that considered visual and aesthetic resources contributing to visual quality, sensitive viewers or receptors, and changes to the character of the area, resulting in potential visual impacts categorized as: generally not substantial, potentially substantial, or substantial. The categories used in this analysis to evaluate impacts are the same as those used in the Draft EIS. The methodology used to assess the visual impacts in this analysis differ from the Draft EIS. Because the Draft EIS evaluated a large number of alternatives, it used a qualitative analysis to reach its conclusions. Because the Supplemental Draft EIS evaluated a single alternative for which more design information was available than at the Draft EIS phase, it was possible to use a standard visual impact assessment method that made extensive use of drawings and photo simulations and employed a systematic evaluation protocol

The analysis of the project's visual quality and aesthetics effects in this Supplemental Draft EIS applies the principles of the standardized approach for visual impact assessment developed by the Federal Highway Administration (FHWA) (FHWA, 1988). This method has been widely adopted by state highway departments and other agencies responsible for development of transportation facilities as the standard for evaluation of project visual effects. For reference, a copy of the FHWA Visual Impact Assessment manual has been included as Attachment J-2 at the end of this appendix to provide complete documentation of the FHWA methodology.

The FHWA developed its visual impact assessment methodology in response to the National Environmental Policy Act of 1969 (NEPA), which requires that consideration be given to the impacts that proposed federal actions or projects are likely to have on the environment's visual quality. The method was designed to provide a systematic approach to the evaluation of visual changes. Since its inception in the late 1980s, this method has been successfully applied by the FHWA and state highway departments, as well as by other visual resource specialists, to evaluate highway and other transportation projects. It is now the standard approach for evaluating the aesthetic impacts of proposed transportation projects. The method applied in preparing this supplemental analysis is based on the principles of the FHWA methodology, and was selected because it is a standardized, widely recognized approach that is highly systematic. In addition, there is a reliance on representative view photographs of the project alignment, and on visualizations of the project's appearance, which provide a tangible sense of the visual character and quality of the areas that the project would affect, as well as an idea of how the project would affect these visual attributes. The discussion below provides a brief summary of how the FHWA assessment methodology was applied to prepare this section of the Supplemental Draft EIS.

B. Identifying and Assessing Viewpoints

The visual impact assessment process began with a review of Google Earth™ air imagery. KMZ files of the revised project layout were superimposed on this imagery to identify areas along the Eden Prairie and St. Louis Park/Minneapolis Segments where revised elements of the project would potentially have a substantial impact on views, particularly those of sensitive viewer groups. A representative subset of views in those areas was photographically documented and used as the basis for the analysis.

Once identified, the existing visual quality of these views was evaluated using a systematic procedure that entails application of numerical ratings. Under the FHWA methodology, the visual quality of a view was evaluated in terms of its vividness, intactness, and unity (which are defined below) and each of these dimensions were scored on a scale of from 1 to 7 for each of these three attributes, where a low score (1) represents low visual quality and a higher score (7) represents high visual quality. The scores for these three dimensions are then added up and divided by three, to produce a summary rating of the view's overall level of visual quality. This assessment considers whether this particular view is common or dramatic. Is it a pleasing composition (a mix of elements that seem to belong together) or not (a mix of elements that either do not belong together or contrast with the other elements in the surroundings)? The resulting metrics supported the overall visual impact determinations.

The visual quality of the identified viewpoints was evaluated and discussed using these terms:

- Vividness is the degree of drama, memorability, or distinctiveness of the landscape components. Overall vividness is an aggregated assessment of landform, vegetation, water features, and human-made components in a view.
- Intactness is a measure of the visual integrity of the natural and human-built landscape, and its freedom from encroaching elements. This factor can be present in well-kept urban and rural landscapes, as well as in natural settings. High intactness means that the landscape is free of unattractive features and is not segmented by features and elements that appear out of place. Low intactness means that visual elements that are unattractive and/or detract from the quality of the view can be seen.
- Unity is the degree of visual coherence and compositional harmony of the landscape, considered as a whole. High unity can be found with an undisturbed natural landscape or in developed environments where individual components of a landscape are well designed and "fit" well in the landscape.

In summary, the visual quality analysis for this Supplemental Draft EIS was initiated by reviewing the viewpoints identified in the Draft EIS and identifying any additional viewpoints that would be warranted due to changes in the definition of the project (i.e., new visually-sensitive areas affected or new major visual changes would occur). In this analysis, an assessment was then made of the visual quality of each of the representative viewpoints as they now exist and of the views as they would appear with the project in place.

C. Assessing Visual Change

For many of the views evaluated in the Supplemental Draft EIS, images were prepared to provide an understanding of how the project features would relate to the view. These visualizations provided the basis for assessing the project-related changes in the visual quality. The assessment of the visual changes for which simulations were not created was based instead on reviews of project plans and drawings, and on the visualizations that were prepared for other views in which similar changes were proposed. The visual conditions under the LPA were evaluated using the same numerical rating system that was used for evaluating the existing view. The numerical ratings of the existing views and views under the LPA were compared to determine the degree of visual change. In evaluating the numerical changes in visual quality between the existing and with-project conditions, a change in visual quality score in the range of 0.1 through 0.5 point was considered to indicate a low level of visual change; a change from 0.6 through 1.0 point as moderately low; a change from 1.1 through 2.0 points as medium; and a change of more than 2.0 points as high.

To identify the overall degree of impact, the assessment of the level of visual change was then related to the sensitivity of the view to the viewer. In assessing the sensitivity of the view, factors taken into account included the following:

- The number and kinds of people who see the view.
- The length of time the view is observed. An assumption was made that residents and recreationists generally have views of long duration, whereas motorists often experience views short duration.
- Potential levels of viewer concern about the visual character and quality of the view. Level of concern is a subjective response that is affected by factors such as the visual character of the surrounding landscape, the activity a viewer is engaged in, and the viewer's values, expectations, and interests. Some of the assumptions about level of concern are that residents and recreationists are likely to be highly sensitive viewers, while commuters and employees in industrial areas may be less sensitive.
- Low viewer sensitivity would occur in situations where there are few viewers who experience a defined view, or when viewers may not be particularly concerned about the view. High viewer sensitivity would occur when there are many viewers who have a view frequently or for a long duration, as well as viewers who are likely to be very aware of and concerned about the view, such as viewers in a residential neighborhood.

The overall levels of visual impact identified in the Supplemental Draft EIS are expressed in terms of the three impact levels (not substantial, possibly substantial, and substantial) used in the Draft EIS. In all situations in which the degree of visual change is low (a change in visual quality score in the range of 0.1 through 0.5 point), the impacts were assumed to be generally not substantial. Impacts were assumed to be potentially substantial in situations with moderately low to medium levels of visual change (i.e., a change from 0.6 through 1.0 point [moderately low] or a change from 1.1 through 2.0 points [medium] and high levels of sensitivity, and substantial impacts were assumed to occur in situations with high levels of visual change (i.e. a change of more than 2.0 points) and moderate to high levels of sensitivity.

3. Project Description

The proposed project, the Southwest Light Rail Transit (METRO Green Line Extension) is an approximately 16 mile proposed extension of the METRO Green Line (Central Corridor LRT) which would operate from downtown Minneapolis through the communities of St. Louis Park, Hopkins, Minnetonka, and Eden Prairie, passing in close proximity to the city of Edina. The proposed alignment includes 17 new stations, approximately 3,800 additional park-and-ride spaces, accommodations for kiss-and-ride facilities, bicycle and pedestrian access, as well as new or restructured local bus routes connecting stations to nearby residential, commercial and educational destinations. Major activity centers from Eden Prairie to St. Paul, including the Eden Prairie Center regional mall, United Health Group campuses, the Opus/Golden Triangle employment area, Park Nicollet Methodist Hospital, the Minneapolis chain of Lakes, downtowns Minneapolis

and St. Paul, the University of Minnesota, and the State Capital area, will be accessible by a one-seat ride. Passengers will be able to connect to the greater METRO system, including METRO Blue Line (Hiawatha LRT), METRO Orange Line (I-35WBRT), Northstar Commuter Rail, METRO Red Line (Cedar Ave BRT) via Blue Line, and the planned METRO Blue Line Extension (Bottineau LRT) as well as future commuter rail, planned Bus Rapid Transit systems and intercity passenger rail line at one of more of the five downtown Minneapolis stations.

4. Affected Environment

Eden Prairie

Overview

This section describes the existing visual quality at 10 viewpoints in the Eden Prairie Segment not evaluated in the Draft EIS where changes to visual quality are possible.

A general description of visual elements within the Eden Prairie Segment was provided in Section 3.6.2.2 of the Draft EIS. As indicated in Table 3.6-2 of the Draft EIS, the environment in this area offers a moderate to low visual quality experience. The visual environment in the Eden Prairie Segment is dominated by relatively recent urban and suburban development. Prominent features include roadways, mid- to low-rise office building campuses, multifamily residential buildings, commercial buildings, water retention ponds, and Purgatory Creek Park. These elements exist in the foreground, the middle ground, and the background of the study area.

Many of the commercial developments and office parks in the segment have landscaping, including lawns and trees. Gently rolling hills toward the north of the segment provide topographical relief. The individual developments have architectural treatments on their façades and other specific design elements, but there are no consistent visual or design elements that link all of the developments together to create a visually integrated whole.

Ten viewpoints represent areas where changes to the visual environment (not discussed in the Draft EIS) could potentially occur as a result of the LPA. The locations of these viewpoints are shown on the key map, Exhibit J-1 in Attachment J-1.1. Photographs depicting the existing conditions seen in the views from these locations are presented in Attachment J-1.1 on the exhibits indicated in the following list. A project overview of the segment is shown on Exhibit 2.5-2 and is described in Section 2.5.1 of the Supplemental Draft EIS.

- **Viewpoint 1** is the view looking southwest from Technology Drive at Mitchell Road (Exhibit J-2).
- **Viewpoint 2** is the view looking southwest along Technology Drive in front of the Optum Health Services headquarters (Exhibit J-3).
- **Viewpoint 3** is the view from Purgatory Creek Trail looking north (Exhibit J-4).
- **Viewpoint 4** is the view from Technology Drive west of the Southwest Transit Center (Exhibit J-5).
- **Viewpoint 5** is the view looking south along Prairie Center Drive at Technology Drive. (Exhibit J-6).
- **Viewpoint 6** is the view from east side of Prairie Center Drive toward Purgatory Creek Park (Exhibit J-7).
- **Viewpoint 7** is the view from Purgatory Creek Park, looking east (Exhibit J-8).
- **Viewpoint 8** is the view north along Prairie Center Drive south of proposed elevated crossing of roadway (Exhibit J-9).
- **Viewpoint 9** is the view from Eden Road looking west (Exhibit J-10).
- **Viewpoint 10** is the Valley View Drive, view looking south toward the intersection with Flying Cloud Drive (Exhibit J-11).

Existing Visual Quality and Aesthetics

Table J-1 summarizes the existing visual quality and aesthetics of the views seen from these viewpoints, using the visual assessment criteria and rating system the FHWA developed. As described in detail in Section 3.1.2.5 of the Supplemental Draft EIS, the existing conditions in these views have been evaluated on a numerical scale from one to seven, where one indicates very low visual quality, four indicates medium or average visual quality, and seven indicates very high visual quality.

TABLE J-1
Existing Visual Quality and Aesthetics by Viewpoint in the Eden Prairie Segment
[Rating Range 1 (very low) to 7 (very high)]

			Vividness		Existing Visual Quality and Aesthetics Intactness		Unity		
View Point	Viewpoint Description	Elements of the Visual Environment	Description	Rating	Description	Rating	Description	Rating	Overall Visual Quality and Aesthetics Rating (Scale of 1-7; 7=very high and 1=very low) [a]
1	View looking southwest from Technology Drive at Mitchell Road	Arterial roadways, asphalt jogging path, and landscaping to the north; natural vegetation and wetlands to the south. Buildings are set back with low visibility.	The overall level of vividness is moderately low.	3.5	With the presence of natural and landscaped vegetation, the visual intactness is medium.	4	Landscaping compatible with natural areas, but no unifying features. Medium overall visual unity.	4	3.8 Moderately Low
2	View looking southwest along Technology Drive in front of the Optum Health Services headquarters	The dominant element is a three-story building in a landscaped business park setting. There are trails and park-like landscaping rather than sidewalks along the arterial.	The overall level of vividness is moderate due to degree of extra landscaping and compatible construction design.	4.3	Components consistent with business park: setbacks, distance between buildings, parking and landscaping. Moderately low visual intactness.	3.8	While relatively new developments, there are no unifying features. Moderately low overall visual unity.	3	3.7 Moderately Low
3	View from the Purgatory Creek Trail looking north	The trail is raised from the natural terrain level with the road. The north side of the trail parallels Purgatory Creek, which is crossed by a rustic pedestrian bridge just south of Technology Drive. There is low vegetation cover and a few trees.	The overall level of vividness is moderate, with a glimpse of the water in the adjacent creek and views of the natural vegetation adjacent to the trail.	4.2	The balance between the natural and landscaped vegetation and the small-scale infrastructure elements results in a medium level of visual intactness.	4	The trail, the adjacent creek, the vegetation, and the low-scale infrastructure features combine to create a visual composition with a medium level of visual unity.	4	4.1 Medium

			Existing Visual Quality and Aesthetics						
			Vividness		Intactness		Unity		
View Point	Viewpoint Description	Elements of the Visual Environment	Description	Rating	Description	Rating	Description	Rating	Overall Visual Quality and Aesthetics Rating (Scale of 1-7; 7=very high and 1=very low) [a]
4	View from Technology Drive west of the SouthWest Transit Center	View of multifamily residential and commercial buildings with landscaping and roadways. Architecture combines similar colors, textures. Views of Purgatory Creek Reservoir and a trail.	The commercial architecture and water features provide a moderate level of vividness.	4	The buildings and landscaping create a moderate level of intactness.	4.5	The surroundings and generally consistent architectural scale and materials create a moderately low level of unity.	3.6	4.2 Medium
5	View looking south along Prairie Center Drive at Technology Drive	View of divided arterial boulevard with large structures supporting traffic signals and road lighting. Dense landscape trees are present along the east side of the road. Purgatory Creek Park is to the west of the boulevard, with trees and lawn. A large office building is in the background.	Flat landform with low vividness. Lawns and planted trees with average level of vividness. Human-made features include roadway, support structures for signals/lighting, large, boxy office buildings. Moderately low level of vividness.	3.3	Given the presence of the visually dominant roadway and associated equipment, the visual intactness of this view is medium.	4.0	Given the somewhat visually disparate set of elements visible in this view, the overall level of visual unity is medium.	4.0	3.8 Moderately Low
6	View from east side of Prairie Center Drive toward Purgatory Creek Park	The view is a divided arterial boulevard and a landscaped park with a large decorative picnic pavilion structure. A large brick-faced parking ramp is present at Southwest Station.	The landform is flat, low level of vividness. Lawns and planted trees with an average level of vividness. Roadway, large parking ramp, the roof of the picnic pavilion, average level of vividness. Moderately low overall vividness.	3.6	Except for the visually dominant roadway, this view is relatively free of intrusive visual elements, creating a moderately high level of visual intactness.	5	The consistent scale and material of the structures and the dense mass of landscape trees across the middle of the view create a moderately high level of visual unity.	5.5	4.7 Medium
7	View from Purgatory Creek Park looking east	A parking lot is in the foreground, with lawns and dense plantings of evergreen and deciduous landscape trees. Dense tree plantings screen much of the commercial development located in the area east of Prairie Center Drive.	Landform is flat, low vividness. Lawns, planted trees with moderately high vividness. Human-made features have average level vividness. Moderately low overall vividness.	3.6	This view is relatively free of significant encroaching elements and has a moderately high degree of intactness.	5	The dense mass of landscape trees across the middle of the view creates a high level of visual unity.	6	4.9 Medium

			Existing Visual Quality and Aesthetics						
			Vividness		Intactness		Unity		
View Point	Viewpoint Description	Elements of the Visual Environment	Description	Rating	Description	Rating	Description	Rating	Overall Visual Quality and Aesthetics Rating (Scale of 1-7; 7=very high and 1=very low) [a]
8	View north along Prairie Center Drive south of proposed elevated crossing of roadway	The view is a divided arterial boulevard, a large parking ramp at Southwest Station, lawns and landscape trees, and an asphalt trail.	Landform is flat, low vividness. Lawns, planted trees, average level of vividness. Roadway, large parking ramp, roof of picnic pavilion with average vividness. Moderately low overall vividness.	3.5	Except for the visually dominant roadway, this view is relatively free of intrusive visual elements, creating a moderately high level of visual intactness.	5	The consistent scale and material of the structures and the presence of landscape trees across the view create a moderately high level of visual unity.	5	4.5 Medium
9	View from Eden Road looking west	The view includes a portion of a parking lot for existing commercial establishments to the north and south of Eden Road. The view forward is of a natural, undeveloped area with deciduous trees with a large, white water tower over the horizon.	There is a moderately low level of vividness due to a mixture of commercial and natural elements, and a large water tower in view.	3.2	There is moderately low intactness since there is a mixture of development features, natural areas, and parking areas.	3	The unity is low to moderate. Unifying features are the grass and trees along the roadway, softening the asphalt parking areas in the view. The water tower breaks up the unity of the landscaping and natural areas.	3	3.1 Moderately Low
10	Valley View Drive, view looking south toward the intersection with Flying Cloud Drive	The view is of a major arterial intersection with multiple office complexes in the background.	The level of vividness is moderately low due to a dominant office park that does not provide any outstanding features.	3.2	Moderately low intactness because the large, dominant arterials intrude and contrast with the visual pattern of landscaped office parks.	3.4	There is low unity among the office buildings' architectural styles and the dominant transportation features.	2.8	3.1 Moderately Low

[a] Scale is from *Visual Impact Assessment for Highway Projects* (FHWA, 1988).

Viewer Groups and Viewer Sensitivity

Viewer groups in the Eden Prairie Segment include park users, drivers, pedestrians, workers, shoppers, and cyclists on the existing street network. Residents and park users are assumed to be more sensitive to change than the other viewer groups; this is assumed to be particularly true for any visual changes that might affect their enjoyment of Purgatory Creek Park.

St. Louis Park/Minneapolis

Overview

This section describes the existing visual quality at six viewpoints in the St. Louis Park/Minneapolis Segment not evaluated in the Draft EIS where changes to visual quality are possible. The visual environment in the St. Louis Park/Minneapolis Segment generally falls within Hennepin County Regional Railroad Authority - owned right-of-way. This environment includes existing trails throughout the length of the segment (i.e., Cedar Lake LRT Regional Trail, Kenilworth Trail, Midtown Greenway, and Cedar Lake Trail; see Exhibit 3.4-4 in the Supplemental Draft EIS) and directly adjacent properties. Views of the right-of-way

and adjacent properties are primarily provided from the existing trails. Views within the segment are dominated by the existing trails themselves and adjacent active freight rail track. The trails and freight rail alignment are generally surrounded by overstory and understory deciduous vegetation. There are some areas of clearing at several locations along the right-of-way that open up the bicycle and pedestrian trail to views of its surrounding urban environment. For example, at locations where the trail crosses roads, areas have been cleared adjacent to residential developments, and at the open, maintained trail corridor north of Burnham Pond. The trails include occasional views of adjacent residential development and occasional views of the distant Minneapolis skyline in the background. A further general description of visual elements along this portion of the segment is provided in Section 3.6.2.4 of the Draft EIS.

Six key viewpoints represent areas where major changes to the visual environment (not discussed in the Draft EIS) could potentially occur as a result of the LPA, suggesting design adjustments since publication of the Draft EIS. Attachment J-1.1 of this technical report presents exhibits with viewpoint locations (see Exhibit J-12), as well as photographs and renderings (see Exhibits J-13 through J-18) for each viewpoint. A project overview of the segment is shown on Exhibit 2.5-4 and is described in Section 2.5.3 of the Supplemental Draft EIS.

- **Viewpoint 1** (Exhibit J-13) is the view northeast from South Chowen Avenue toward the existing rail and trail corridor.
- **Viewpoint 2** (Exhibit J-14) is the view looking north near Lake Street..
- **Viewpoint 3** (Exhibit J-15) is the view from a point north of Cedar Lake Parkway looking north toward the tunnel portal south of the channel crossing.
- **Viewpoint 4** (Exhibit J-16) is the view from the bike trail at the south side of the channel crossing.
- **Viewpoint 5** (Exhibit J-17) is the view from the channel looking northwest toward the channel crossing.
- **Viewpoint 6** (Exhibit J-18) is the view northwest from West 21st Street at Thomas Avenue toward the existing rail and trail corridor.

Existing Visual Quality and Aesthetics

Table J-2 summarizes the existing visual quality and aesthetics of the views seen from these viewpoints, using the visual assessment criteria and rating system the FHWA developed. As described in more detail in Section 3.1.2.5 of the Supplemental Draft EIS, the existing conditions in these views have been evaluated on a numerical scale from one to seven, where one indicates very low visual quality, four indicates medium or average visual quality, and seven indicates very high visual quality.

TABLE J-2
Existing Visual Quality and Aesthetics by Viewpoint in the St. Louis Park/Minneapolis Segment
[Rating Range 1 (very low) to 7 (very high)]

View Point	Viewpoint Description	Elements of the Visual Environment	Existing Visual Quality and Aesthetics						Overall Rating[a]
			Vividness		Intactness		Unity		
			Description	Rating	Description	Rating	Description	Rating	
1	View northeast from South Chowen Avenue toward the existing rail and trail corridor	Paved city street, on-street parking and no sidewalks bordered by low vegetation and dense rows of overhanging trees. Break in trees provides partial view into rail and trail corridor bordered at the far side by a dense mass of tall trees.	No topographic variation. The paved street is the only visible human-made element. The tree canopy over the street and the mass of trees bordering the far side of the rail and trail corridor are the most memorable elements.	3.8	View is relatively free of visual encroachment. The most visually intrusive elements are the cars parked along the street.	5	The parallel street and rail/trail corridors enframed by dense walls of trees create a degree of visual cohesion, but the view does not have focal point or a high level of visual organization.	4	4.3 Medium
2	View looking north near Lake Street	Paved bike and pedestrian trails paralleled by a narrow, at-grade freight rail line behind a rustic split rail fence. Corridor bordered by trees of a variety of species. Glimpses through trees of nearby low-rise and high-rise residential structures.	No topographic variation. Human-made features mostly utilitarian. Trees bordering corridor the most memorable element.	3.5	View is relatively free of visual encroachment. Visual intrusiveness of the rail line is reduced by its small scale and location behind the split rail fence.	5	Unity of the view is slightly reduced by the curving alignment of the corridor and the contrasting appearance of the trees of widely varying species planted along this segment.	5	4.5 Medium
3	View from a point north of Cedar Lake Parkway looking north toward the tunnel portal south of the channel crossing	Wide, paved bike trail paralleled by a narrow, at-grade freight rail line, cutting through an area of overstory and understory deciduous vegetation. Rustic split rail fence separates trail from rail line.	No topographic variation. Human-made features mostly utilitarian. Dense regular mass of trees bordering corridor create a highly memorable element.	4	View is relatively free of visual encroachment. Visual intrusiveness of the rail line is reduced by its small scale and location behind the split rail fence.	5	Parallel trail and rail corridors enframed by dense wall of trees create a cohesive visual pattern.	6	5.0 Moderately High
4	View from the bike trail at the south side of the channel crossing	Wide, paved trail paralleled by a narrow, at-grade freight rail line, cutting through an area of overstory and understory deciduous vegetation. Rustic split rail fence separates trail from rail line. View includes at-grade bridges that cross over channels.	No topographic variation. Human-made features mostly utilitarian. Most vivid feature is dense massing of trees bordering corridor.	4	View is relatively free of visual encroachment. Visual intrusiveness of freight rail line is reduced by its small scale and location behind the split rail fence.	5	Parallel trail and rail corridors enframed by dense wall of trees create a cohesive visual pattern.	6	5.0 Moderately High

View Point	Viewpoint Description	Elements of the Visual Environment	Existing Visual Quality and Aesthetics						Overall Rating[a]
			Vividness		Intactness		Unity		
			Description	Rating	Description	Rating	Description	Rating	
5	View from the channel looking northwest toward the channel crossing	Waterway framed by banks with a dense cover of understory and overstory deciduous trees. Rustic and massive appearing trestle constructed of heavy timber is the focal point of the view.	Water and sloped banks add to vividness of view, along with dense massing of trees, and distinctive-looking trestle.	4.6	View is relatively free of visual encroachment. Heavy construction of trestle that partially blocks view down the channel creates an element of encroachment.	5	The view's elements generally combine to create a coherent composition.	5.5	5.0 Moderately High
6	View northwest from West21st Street at Thomas Avenue toward the existing rail and trail corridor.	Street intersection bordered by tall thick trees. View toward point where rail/trail corridor through heavily forested area crosses a two-lane street	No topographic variation. The human-made elements include the paved streets, the bike trail, and rail lines as they cross the streets. The tree masses that border the streets, and the glimpse of the cleared rail/trail corridor through the thick trees create a moderate degree of memorability	4	View is relatively free of visual encroachment.	5	The view up the tree-bordered road provides a focal point for the view, and the hint of the rail/trail corridor cut through the forest provides a point of visual interest.	5.5	4.8 Medium

[a] Scale is from Publication FHWA-HI-88-054, *Visual Impact Assessment for Highway Projects* (FHWA, 1988).

Source: CH2M HILL, 2013.

Viewer Sensitivity

The sensitive viewer groups present in the St. Louis Park/Minneapolis Segment include adjacent residents and recreational users of the trails and the channel connecting the lakes, who have a high level of visual sensitivity.

5. Potential Environmental Impacts

Eden Prairie

Introduction

This section identifies the potential long-term and short-term visual and aesthetic impacts of the visual changes that the project would bring about in the area along the Eden Prairie Segment. This analysis focuses on the changes that would occur in the views seen from each of the 10 representative viewpoints. Based on the predicted impacts, an identification is made of appropriate measures to mitigate the project's aesthetic impacts.

Long-term Direct and Indirect Visual Quality and Aesthetics Impacts

New elements introduced with the LPA in the Eden Prairie Segment would consist of light rail guideway (some at-grade and some structured), including tracks, signal systems, and overhead wires, stations, structured and surface park-and-ride lots, and traction power and signal substations. Viewpoints were selected in areas of potential change to the visual and aesthetic environment. Exhibits J-2 through J-11 in

Attachment J-1.1 present photographs of the existing view from each viewpoint, and below some of the photographs is a preliminary rendering that depicts the view as it would appear with the project elements in place. The rendering of the view with the project in place was compared with the photograph of the existing view. This comparison provided a basis for making a determination of the visual change the project would bring about and the nature and level of any visual impacts that would be created. Because visualizations were not prepared for all views evaluated in the Eden Prairie Segment, the assessments of the visual changes were made based on review of project plans and drawings and of the visualizations that had been prepared for other views in which similar changes were proposed.

Table J-3 summarizes the anticipated visual quality and aesthetics changes that would occur within each of the 10 Eden Prairie Segment viewpoints, and evaluates the changes to visual quality through application of the FHWA visual impact assessment system to assess the view as it would appear with the project in place. An assessment was made of each of the three landscape dimensions (vividness, intactness, and unity), rating each dimension using the seven-point evaluation scale. Comparison of these scores and the overall score versus the scores for the view's existing condition provided a basis for pinpointing the nature and degree of the changes to the view's level of visual quality. A brief narrative following the table summarizes the visual changes and the nature and degree of visual impact to each of the views.

TABLE J-3
Anticipated Direct Change and Impact in Visual Quality and Aesthetics from Eden Prairie Segment Viewpoints

Viewpoint Number, Viewpoint Description, and Identification of New Visual Elements	Vividness		Intactness		Unity		Overall Rating[a]	Visual Quality and Aesthetics Change[a] and Impact (Scale of 1-7; 7=very high and 1=very low)
	Description of Change	Rating[a]	Description of Change	Rating[a]	Description of Change	Rating[a]		
1. View looking southwest from Technology Drive at Mitchell Road At-grade LRT would require removing vegetation and adding fill on the south side of the road in a corridor that extends to Mitchell Station.	The overall level of vividness of this view, which is currently moderately low, would remain the same.	3.5	The intactness of this view would be reduced by the removal of vegetation and widening the infrastructure corridor.	3.5	The level of visual unity would remain about the same, because the LRT would be a consistent element along this roadway.	3.5	3.5	From 3.8 to 3.5 Low
2. View looking southwest along Technology Drive in front of the Optum Health Services headquaters The at-grade LRT alignment would locate along the south side of Technology Road and require relocating the trail and landscaping.	The overall level of vividness would remain moderate because the LRT would be integrated into the landscaping.	4.1	While there would be a noticeable change, the visual intactness would remain moderate because landscaping and park-like features would remain.	3.7	The overall level of visual unity is medium to low and may be enhanced through integrating the LRT to unify the infrastructure with the landscaping.	3.4	3.7	From 3.7 to 3.7 Low

Viewpoint Number, Viewpoint Description, and Identification of New Visual Elements	Vividness		Intactness		Unity		Overall Rating[a]	Visual Quality and Aesthetics Change[a] and Impact (Scale of 1-7; 7=very high and 1=very low)
	Description of Change	Rating[a]	Description of Change	Rating[a]	Description of Change	Rating[a]		
3. View from the Purgatory Creek Trail looking north at The trail would be relocated to the south of the LRT. The LRT guideway would cross Purgatory Creek in front of the existing pedestrian bridge.	The overall level of vividness may be lowered; signs and crossing arms visible among the natural setting nearest the trail. LRT facilities may be dominant in view from trail.	3.2	Visual intactness level would remain about the same. Although elements would be added to the view, they would be designed to be compatible with the existing landscape features.	3.5	The moderate unity would remain, because sensitive design features would accommodate the trail into the design. Native landscaping and detouring the trail would avoid an unsafe crossing of the LRT tracks.	4	3.6	From 4.1 to 3.6 Low
4. View from Technology Drive west of the Southwest Transit Center[b] The at-grade light rail would travel from the south side of Technology Drive, adjacent to Purgatory Creek Reservoir, and cross the road diagonally to access the Southwest Transit Center. A parking ramp would extend diagonally from the west side of the Southwest Transit Center, following the alignment of the light rail line, and the area between this parking ramp and Technology Drive would be converted to access drives.	The overall level of vividness of this view, which is currently moderate, would remain the same.	4	The intactness of this view would be slightly reduced by the LRT corridor, removing some natural areas along the Purgatory Creek Reservoir and some of the landscaping currently visible in front of the Transit Center.	4.0	The level of visual unity would be increased to some degree because the linear LRT features would visually tie together the disparate elements in the view.	4	4.0	From 4.2 to 4.0 Low
5. View looking south along Prairie Center Drive at Technology Drive A concrete elevated light rail structure would travel along the western edge of the roadway, adding a visually prominent structure to the setting that would split the view.	The overall level of vividness of this view, which is currently moderately low, would remain the same.	3.3	The intactness of this view would be substantially reduced by addition of the large, visually dominant LRT structure in the immediate foreground.	2.0	The level of visual unity would remain about the same because of the consistency of the elevated light rail structure's alignment with the other linear features in the view, and because the structure would serve as a visually unifying view element.	4.5	3.3	From 3.8 to 3.3 Low

Viewpoint Number, Viewpoint Description, and Identification of New Visual Elements	Vividness		Intactness		Unity		Overall Rating[a]	Visual Quality and Aesthetics Change[a] and Impact (Scale of 1-7; 7=very high and 1=very low)
	Description of Change	Rating[a]	Description of Change	Rating[a]	Description of Change	Rating[a]		
6. View from east side of Prairie Center Drive toward Purgatory Creek Park A concrete elevated light rail structure would pass along the opposite side of the road, adjacent to the park, adding a visually prominent structure to the setting. Because of the structure's height and widely spaced supports, views into the park would be maintained.	The vividness of this view would be slightly increased by the addition of the visually striking LRT structure.	4.0	Introduction of a new and visually dominant element into the view would reduce visual intactness.	2.0	The level of visual unity would remain about the same, because of consistency of the elevated light rail structure's alignment with the other linear features in the view; the structure would serve as a visually unifying element.	5.5	3.8	From 4.7 to 3.8 Moderately Low
7. View from Purgatory Creek Park looking east A concrete elevated light rail structure along eastern edge of park, adding prominent structure to setting. Densely planted landscape trees between the park's primary use areas and the elevated structure would reduce the structure's visibility and integrate it into the view. Over time, with tree growth, the degree of visual integration would increase.	The addition of the elevated LRT structure would create a slight increase in the overall vividness of this view.	4.3	The overhead LRT structure would contrast with the visual character of the other elements in the view, reducing the overall level of visual intactness.	3.0	The level of visual unity would remain about the same because of the consistency of the elevated light rail structure's alignment with the other linear features in the view.	6.0	4.4	From 4.9 to 4.4 Low
8. View north along Prairie Center Drive south of proposed elevated crossing of roadway A large, concrete elevated light rail structure would cross the boulevard at this viewpoint and travel northwest along the opposite edge of the roadway, adding a visually prominent structure to the setting.	The vividness of this view would be slightly increased by the addition of the visually striking LRT structure.	4.0	The LRT structure would dominate and intrude on what is now an open view with a suburban character, substantially decreasing the level of intactness.	2.0	Visually dominant element would be present, but level of visual unity would remain due to consistency of elevated structure's alignment with other linear features; the structure would be a unifying element.	5.0	3.6	From 4.5 to 3.6 Moderately Low

Viewpoint Number, Viewpoint Description, and Identification of New Visual Elements	Vividness		Intactness		Unity		Overall Rating[a]	Visual Quality and Aesthetics Change[a] and Impact (Scale of 1-7; 7=very high and 1=very low)
	Description of Change	Rating[a]	Description of Change	Rating[a]	Description of Change	Rating[a]		
9. View from Eden Road looking west The LPA includes a Town Center Station, which would extend Eden Road, replace some parking areas, and remove the natural vegetation north of Market Place Shopping Center.	The LPA may enhance the low to moderate vividness with the addition of modern transportation features.	3.6	The intactness of the view may be slightly reduced with the addition of rails and catenaries, which are likely to contrast with their surroundings.	2.5	Unless appropriate design and landscape measures are taken the new project elements may have the potential to reduce the visual unity of the view.	2.5	2.9	From 3.1 to 2.9 Low
10. Valley View Drive, view looking south toward the intersection with Flying Cloud Drive LRT alignment would be elevated east from Viking Drive to Prairie Center Drive. The guideway would block views from office building in southwest corner of this intersection.	The elevated guideway would not reduce the low to moderate vividness, because the area is dominated by large infrastructure features.	3.2	The elevated guideway may lower the already moderately low level of intactness, since it may increase the views of concrete transportation features to this area.	2.5	The LRT would slightly lower the already low unity, because the structure may block views of the office park; but this change is not significant, because the view is dominated by arterial roadways and access to the highway.	2.8	2.8	From 3.1 to 2.8 Low

[a] Scale is from *Visual Impact Assessment for Highway Projects* (FHWA, 1988). This rating is an assessment of the visual quality change. The overall level of impact is described in the text below.

[b] The scope of the LPA as identified by the Metropolitan Council (Council) includes a proposed western terminus at the Mitchell Station south of Technology Drive and west of Mitchell Road. As part of the design and engineering process, the Council also developed a design adjustment that would implement a western terminus of the proposed light rail line at the Southwest Station. Under this adjustment, the proposed structured park-and-ride lot at the Southwest Station would increase by approximately 600 spaces (from 450 spaces with the western terminus at Mitchell Station to 1,050 spaces under the western terminus at Southwest Station). With the western terminus at the Southwest Station, the height of proposed structured park-and-ride lot at the Southwest Station would increase by two floors and its footprint would approximately double (generally extending further to the south). Because of the nature of the potential improvements and the existing visual environment, there would be little change in the level of visual impacts at this viewpoint.

Viewpoint 1 – View Looking Southwest from Technology Drive at Mitchell Road (Exhibit J-2)

Overall Level of Impact: Not Substantial

Development of the at-grade LRT would require removing vegetation and adding fill on the south side of the road, in a corridor that extends to Mitchell Station. Although the visual character of this view would change somewhat (the view would appear more developed), the overall change to the visual quality of the view would be low, especially with attention to careful design, placement of LRT elements, and installation of appropriate landscaping.

Viewpoint 2 – View Looking Southwest along Technology Drive in front of the Optum Health Services Headquarters (Exhibit J-3)

Overall Level of Impact: Not Substantial

The at-grade LRT alignment would be located along the south side of Technology Drive, and would require relocation of the trail and landscaping. The visual character of the view would change with installation of the tracks and catenaries in the area in front of the buildings, but overall change to the visual quality would be

low, especially with careful design and placement of LRT elements and installation of appropriate landscaping to tie all of the elements of this view together.

Viewpoint 3 - View from the Purgatory Creek Trail Looking North (Exhibit J-4)

Overall Level of Impact: Not Substantial

The trail would be relocated to the south of the LRT alignment. The LRT guideway would cross Purgatory Creek in front of the existing pedestrian bridge. Project features visible in this view would include a new bridge structure located in front of the existing bridge, tracks, catenaries, and a fence along the LRT right-of-way. These features would be readily visible from this view and would create a moderate level of increase in the intensity of development seen in the view. However, the impact to the overall visual quality of the view would be low in that the project features will be similar in form and in their linear alignment to the other features along Technology Drive, and as a consequence, the effects on the visual intactness and unity of the view will be low. The new LRT bridge across Purgatory Creek is likely to result in a small increase in the vividness of the view. Taking these factors into account, overall, the change in the visual quality of the view will be low.

Viewpoint 4 - View from Technology Drive West of the Southwest Transit Center (Exhibit J-5)

Overall Level of Impact: Not Substantial

The at-grade light rail would travel from the south side of Technology Drive, adjacent to Purgatory Creek Reservoir and cross the road diagonally to access the Southwest Transit Center. A structured park-and-ride lot would extend diagonally from the west side of the Southwest Transit Center, following the light rail alignment, and the area between this parking ramp and Technology Drive would be converted to access drives. As a result of the project's development, there will be some removal of natural areas along Purgatory Creek Reservoir and the view will appear more intensively developed. The view's level of vividness will remain about the same, and there will be a moderate decrease in the level of visual intactness. The level of visual unity will increase because the LRT's tracks, catenaries, and fencing will create a linear feature that visually ties together the disparate visual elements now seen on the left and right sides of Technology Drive.

Viewpoint 5 - View Looking South along Prairie Center Drive at Technology Drive (Exhibit J-6)

Overall Level of Impact: Not Substantial

A concrete elevated light rail structure would travel along the western edge of the roadway, adding a visually prominent structure to the setting that would split the view. With the addition of the overhead structure, the visual character of this view would be changed by the enclosure of the view and the greatly increased level of development. . The overall level of vividness of this view, which is currently moderately low, would remain the same. The intactness of this view would be substantially reduced by addition of the large, visually dominant LRT structure in the immediate foreground. The level of visual unity would remain about the same because of the consistency of the elevated light rail structure's alignment with the other linear features in the view, and because the structure would serve as a visually unifying view element. The overall change to the level of visual quality of this view would be low.

Viewpoint 6 - View from East Side of Prairie Center Drive toward Purgatory Creek Park (Exhibit J-7)

Overall Level of Impact: Substantial

A concrete elevated light rail structure would pass along the opposite side of the road, adjacent to the park, adding a visually prominent structure to the setting. Because of the structure's height and widely spaced supports, views into the park would be maintained. The overhead structure would become a visually dominant element in the view, and would change the visual character of this view, specifically the area seen in the view will appear to be more intensively developed and creating a sense of enclosure. The overall change to visual quality would be moderately low. The sensitivity of this view is moderate to high because of its visibility to high numbers of roadway users and pedestrians. Even though the change to visual quality will be moderate, given the view's visual sensitivity, the visual impact will be potentially substantial.

Viewpoint 7 - View From Purgatory Creek Park Looking East (Exhibit J-8)

Overall Level of Impact: Not Substantial

A concrete elevated light rail structure would be built along the eastern boundary of the park, adding a visually dominant linear element to the setting that would frame the park's eastern edge. Densely planted landscape trees between the park's primary use areas and the elevated structure would have high potential to reduce the structure's visibility and integrate it into the view. Over time, with tree growth, the degree of visual integration would increase. Even though this view is highly sensitive because it is seen by recreational viewers, because of the visual screening provided by the trees in the park, the LRT's overall impact on the visual quality of this view would be low.

Viewpoint 8 - View Looking North along Prairie Center Drive South of Proposed Elevated Crossing of Roadway (Exhibit J-9)

Overall Level of Impact: Substantial

A concrete elevated light rail structure would cross the boulevard at this viewpoint and travel northwest along the opposite edge of the roadway, adding a visually dominating structure to the setting. Although the presence of this structure would make this view feel more enclosed and intensively developed, the change to overall visual quality would be moderately low. This view is moderately sensitive because it is seen by large numbers of roadway users ate close range. Even though the change to visual quality will be moderately low, given the view's visual sensitivity, the visual impact will be substantial.

Viewpoint 9 - View Looking from Eden Road Looking West (Exhibit J-10)

Overall Level of Impact: Not Substantial

The LPA includes a Town Center Station, which would include construction of a short segment of local roadway extending west from Eden Road, replace some parking areas, and remove the natural vegetation north of Market Place Shopping Center. The visual character of this view would be substantially changed, with replacement of the lower density development, now hidden by trees, with the LRT and LRT station. The visual quality of the view would be reduced because of the removal of vegetation and the introduction of the tracks and catenaries, which could reduce the visual intactness and visual unity of this view.

Viewpoint 10 - Valley View Drive, View Looking South Toward Intersection with Flying Cloud Drive (Exhibit J-11)

Overall Level of Impact: Not Substantial

An elevated LRT structure would pass across this view from left to right and then continue along the north side of Flying Cloud Drive, seen on the right side of the photo. With the addition of the elevated structure, the visual character would be substantially changed, and there is likely to be obstruction of views from the upper stories of the office building seen in the center of the photo. The visual quality of this view is already moderately low. With the visual changes brought about by the project .the level of vividness of the view remain the same, but the presence of the contrasting overhead LRT structure would contribute to small decreases in the intactness and unity of the view. Overall, there would be a low level of change in the visual quality of the view.

Short-Term Visual Quality and Aesthetics Impacts

Potential short-term impacts on the 10 key viewpoints while constructing the LPA may occur because of the placement of staging areas, the presence of equipment, and materials storage in areas visible to sensitive users such as those in residences and recreational areas abutting the alignment.

The contractor would comply with appropriate federal, state, and local regulations concerning the removal of existing vegetation. Prior to construction, a plan for protecting existing trees and vegetation that could be injured during construction activities would be developed. Because any construction period visual changes would be limited in nature and short-term, they would be generally not substantial.

St. Louis Park/Minneapolis

Introduction

This section identifies the potential long-term and short-term visual and aesthetic impacts of the visual changes that the project would bring about in the area along the St. Louis Park/Minneapolis Segment. This analysis focuses on the changes that would occur in the views seen from each of the six representative viewpoints. Based on the predicted impacts, an identification is made of appropriate measures to mitigate the project's aesthetic impacts.

Long-term Direct and Indirect Visual Quality and Aesthetics Impacts

This section describes the potential long-term direct and indirect impacts to the six key viewpoints within the St. Louis Park/Minneapolis Segment where there would be a mix of at-grade and below-grade LRT infrastructure. Visual changes associated with the LPA in all areas of this segment would include those associated with vegetation removal, relocation of the existing freight rail tracks, relocation of trails, and the addition of station facilities. In the at-grade sections, there would also be impacts associated with the LRT tracks, signal systems, catenary wires, safety fencing, and sound walls. The at-grade crossing of the Kenilworth Channel would require construction of new bridge structures. In the transition areas between the at-grade and below-grade segments, there would be impacts associated with portal structures. The viewpoints selected to assess the visual changes created by the light rail-related improvements and freight rail modifications in the St. Louis Park/Minneapolis Segment are located primarily in areas where the highest levels of visual change would take place. Exhibits J-13 through J-18 present photographs of the existing view from each viewpoint, and below some of the photographs is a preliminary rendering that depicts the view as it would appear with the project elements in place. The rendering of the view with the project in place was compared with the photograph of the existing view. This comparison provided a basis for making a determination of the visual change the project would bring and the nature and level of any visual impacts that would be created. Because visualizations were not prepared for all views, the assessments of the visual changes were made based on review of project plans, drawings, and visualizations that had been prepared for other views in which similar changes were proposed.

Table J-4 summarizes the anticipated visual quality and aesthetics changes that would occur within each of the six St. Louis Park/Minneapolis Segment viewpoints, and evaluates the changes to visual quality through application of the FHWA visual impact assessment system to assess the view as it would appear with the project in place. An assessment was made of each of the three landscape dimensions (vividness, intactness, and unity), rating each dimension using the seven-point evaluation scale. Comparison of these scores and the overall score for the view with the scores for the view's existing condition provided a basis for pinpointing the nature and degree of the changes to the view's level of visual quality. A brief narrative following the table summarizes the visual changes and the nature and degree of visual impact to each of the views.

TABLE J-4
Anticipated Direct Change and Impact in Visual Quality and Aesthetics from St. Louis Park/Minneapolis Segment Viewpoints

VPN, Viewpoint Description, and Identification of New Visual Elements	Vividness		Intactness		Unity		Overall Rating[a]	Visual Quality and Aesthetics Change[a] (Scale of 1-7; 7=very high and 1=very low)
	Description of Change	Rating[a]	Description of Change	Rating[a]	Description of Change	Rating[a]		
1. View northwest from South Chowen Avenue toward the existing rail and trail corridor Addition of LRT right-of-way in corridor with catenaries and perimeter fencing on left side of view. Bike and pedestrian trails pushed closer to the street. Addition of West Lake Station with waiting platform, catenaries, and perimeter fencing.	Removal of trees along north side of street and along the northern perimeter of the rail/trail corridor would decrease the vividness of the vegetation. The addition of the station structures would make a positive contribution to the level of vividness that counterbalances the loss of vividness due to vegetation removal.	3.8	Intactness reduced by the removal of trees, the addition of the station infrastructure, and the overhead equipment required by the LRT.	4.5	The visual unity of this view is likely to be increased by the tree clearing that would open the view corridor along the road and open up a view toward the station, which would provide the visual focal point of a well-ordered rail/trail/transit corridor.	5	4.4	From 4.3 to 4.4 Low (positive increase)
2. View looking north near Lake Street LRT would be out of sight, buried under bike and pedestrian trail. Substantial removal of existing vegetation along the east side of the corridor.	Removal of trees along south side of corridor decreases vividness of vegetation. Exposure of distinctive residential tower structures increases vividness of human-made elements.	3.5	Intactness reduced by removal of trees along southern edge of corridor and the exposure of the tall, visually-intrusive residential towers.	3.5	Removal of trees and visibility of the residential towers combine to create a substantial decrease in the visual unity of the view.	3.5	3.5	From 4.5 to 3.5 Moderate
3. View from a point north of Cedar Lake Parkway looking north toward the tunnel portal south of the channel crossing Addition of LRT right-of-way to north of bike and pedestrian trail, with shift of freight line into a widened area along the northern edge of the corridor. Addition of a fenced transition to the tunnel portal next to the bike trail.	Removal of large trees along the edges of the corridor that now contribute substantially to the vividness of the view would reduce the vividness of the view.	3.3	Intactness reduced by reduction in the tree canopy and by addition of fencing and overhead equipment required by the LRT.	4.0	Unity reduced by reduction of the extent of the tree canopy that currently frames the view and gives it a high level of visual unity.	4.5	3.9	From 5.0 to 3.9 Moderate

VPN, Viewpoint Description, and Identification of New Visual Elements	Vividness		Intactness		Unity		Overall Rating[a]	Visual Quality and Aesthetics Change[a] (Scale of 1-7; 7=very high and 1=very low)
	Description of Change	Rating[a]	Description of Change	Rating[a]	Description of Change	Rating[a]		
4. View from the bike trail at the south side of the channel crossing Trail corridor would be widened to accommodate aboveground segment of the LRT as it approaches the channel crossing. Freight line moved north up to 4 feet. Installation of fencing on both sides of the bike/pedestrian trail corridor.	Reduction in tree masses immediately adjacent to the trail and elimination of the fencing along the trail would reduce the vividness of the view.	3.3	Fencing located immediately adjacent to the trail corridor and presence of new rail corridor with overhead infrastructure would intrude on the view, reducing intactness.	3.5	View's current high level of unity would be reduced by reduction in the tree masses that now enframe the view and by the addition of disparate built elements.	4.5	3.8	From 5.0 to 3.8 Moderate
5. View from the channel looking northwest toward the channel crossing Vegetation on the banks at the channel crossing would be cleared to accommodate constructing a bridge across the channel to carry the LRT, bike and pedestrian trails, and freight.	The clearing would slightly decrease the vividness of the vegetation. The new bridge would include a careful design that would add to the vividness of the view.	5.0	The intactness of the view would be reduced by the creation of the cleared area adjacent to the bridge and the addition of more built elements to the view.	3.5	The attractive design of the bridge to carry bike and pedestrian trails, light rail, and freight rail would serve as a visually unifying element. The increased clearance and openness under the bridge would create a visual connection between the segments of the lagoon north/south of the new bridges.	5.5	4.6	From 5.0 to 4.6 Low
6. View northwest from West21st Street at Thomas Avenue toward the existing rail and trail corridor. Substantial clearing of vegetation currently screens views into station site. Station and associated catenaries and fencing would be visible. Wide sidewalks installed along edges of streets in views.	Removal of trees on left side of view would decrease the vividness of the vegetation. The addition of the station structures would make a positive contribution to the level of vividness that counterbalances the loss of vividness due to vegetation removal.	4	Intactness reduced by the removal of trees and the addition of the station infrastructure and the overhead equipment required by the LRT.	4.5	. Intactness reduced by the removal of trees and the addition of the station infrastructure and the overhead equipment required by the LRT.	6	4.7	From 4.8 to 4.7 Low

[a] Scale is taken from Publication FHWA-HI-88-054, *Visual Impact Assessment for Highway Projects* (FHWA, 1988). This rating is an assessment of the visual quality change. The overall level of impact is described in the text below.

Acronym:

VPN = viewpoint number

Source: CH2M HILL, 2013.

Viewpoint 1 – View Northeast from South Chowen Avenue toward the Existing Rail and Trail Corridor

Overall Level of Impact: Not Substantial (Exhibit J-13)

In this view, clearance of the trees and other vegetation along the left side of the street would open up the views into to the rail/trail/transit corridor. The corridor would have a more developed appearance, with the

addition of the LRT, its catenaries, and its perimeter fences; the addition of the West Lake Station, its waiting platform, catenaries, fencing, and surrounding paved circulation area would also contribute to a more developed appearance. The existing pedestrian and bike trails would be pushed closer to the street, where they would be more visible. After these changes, the overall visual effects of the project would be slightly positive. The removal of the dense trees along South Chowen Avenue would make the view more expansive, and the West Lake Station would provide a visual focal point, making the view more interesting and memorable than it is at present. The lines of the linear features in the rail/trail/transit corridor would be consistent with each other and with the lines of the street, contributing to the creation of a visually unified composition. Because this view is seen by the residents of the high-density buildings along South Chowen Avenue and Abbott Avenue, there is a high level of sensitivity; therefore, while the project's visual effects would be slightly positive, careful design of the project in this area would be required.

Viewpoint 2 – View Looking North Near Lake Street (Exhibit J-14)

Overall Level of Impact: Substantial

The LRT alignment would be out of sight, located under the bike and pedestrian trail. The primary visual impact would consist of removal of existing vegetation along the east side of the corridor. This tree removal would decrease the mass of the existing vegetation that is an important contributor to this area's visual quality, and would reveal the tall, visually intrusive residential tower structures located south of the trail corridor. The overall level of change to the visual quality of this view would be moderate. Given the high visual sensitivity of views in this area to recreational and nearby residential viewers, this moderate level of change to visual quality is considered substantial.

Viewpoint 3 – View from a Point North of Cedar Lake Parkway Looking North toward the Tunnel Portal South of the Channel Crossing (Exhibit J-15)

Overall Level of Impact: Substantial

In this view, a number of new elements would give the corridor a more highly developed character, including the insertion of the LRT tunnel portal, an alignment shift into right-of-way in the area to the north of the bike and pedestrian trail, and shifting of the freight line into a widened area along the northern edge of the corridor. In addition, these changes would require removal of many large trees along the edges of the corridor that now contribute substantially to visual quality. As a result, there would be a moderate level of change in the view's level of visual quality. As in other areas along the Kenilworth Corridor, the level of visual sensitivity is high. The result would be a moderate level of change to visual quality that is potentially substantial.

Viewpoint 4 – View from the Bike Trail at the South Side of the Channel Crossing (Exhibit J-16)

Overall Level of Impact: Substantial

The trail corridor seen in this view would be widened to accommodate the aboveground segment of the LRT alignment as it approaches the channel crossing. The freight line would be shifted slightly to the north. Fencing would be installed on both sides of the bike/pedestrian trail corridor. Reduction in the tree masses immediately adjacent to the trail and elimination of the existing split rail fencing along the trail would further reduce the visual quality of the view. The overall reduction in the visual quality of this view would be moderate. As in other areas along the Kenilworth Corridor, the level of visual sensitivity is high. Consequently, this moderate level of change to visual quality is substantial.

Viewpoint 5 - View from the Channel Looking Northwest towards the Channel Crossing (Exhibit J-17)

Overall Level of Impact: Not Substantial

Vegetation on the banks at the channel crossing would be cleared to accommodate construction of a bridge across the channel to carry the LRT alignment, bike and pedestrian trails, and freight. The vegetative clearing would cause some reduction in the visual quality of the view. However, the bridge, as currently conceived, would include a careful design that would become a positive focal point in the view. The overall change to the view's level of visual quality would be low. Because of the recreational activity in the channel, this view is

visually sensitive. However, because the potential level of change to visual quality would be low the potential visual impact would be generally not substantial

Viewpoint 6 – View Northwest from West 21st Street at Thomas Avenue toward the Existing Rail and Trail Corridor (Exhibit J-18)

Overall Level of Impact: Not Substantial

Removal and thinning of the vegetation on the left side of the view would open the view up, making it more expansive. The tree removal would permit views into the rail/trail/transit corridor, and would make the new 21st Street Station a focal point in the view. The addition of the light rail infrastructure would cause a moderate reduction in the visual intactness. Overall, though, the change in the visual quality of this view would be low. Because this view is seen by the occupants of homes in the nearby residential areas and those traveling to the recreational facilities on Cedar Lake, the level of visual sensitivity is high. Although the sensitivity of the viewers in this area is high, because the change to the level of visual quality will be low, the overall level of visual impact will not be substantial.

Short-Term Visual Quality and Aesthetics Impacts

Potential short-term impacts on the six key viewpoints while constructing the LPA would be consistent with those described in Section 3.6.4 of the Draft EIS. Such impacts would be associated with construction staging areas; concrete and form installation; removal of some of the existing vegetation along the trail; lights and glare from construction areas; and dust and debris.

6. Potential Mitigation Measures

Eden Prairie and St. Louis Park/Minneapolis

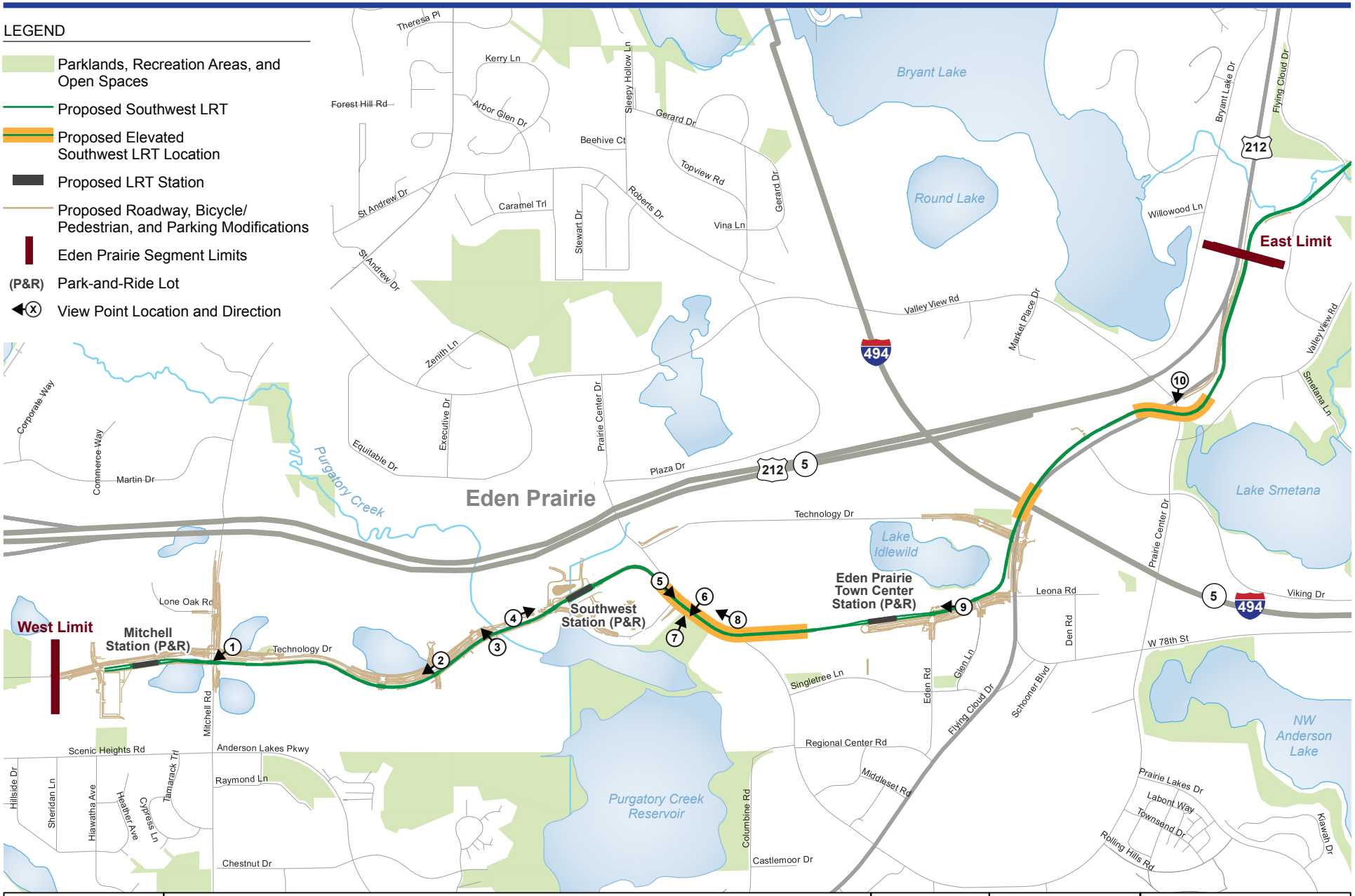
Based on FHWA guidelines the Council will consider mitigation measures for visual quality impacts that are deemed substantial and will identify in the Final EIS the mitigation measures to be incorporated into the project. The Council will develop aesthetic guidelines for the design of the project. These guidelines will address mitigation measures for visual impacts identified in the Final EIS and will address input from the affected communities. Mitigation measures for substantial adverse impacts resulting from the light rail elements will be identified during advanced engineering and could include measure such as landscaping, visual treatments and continuity with the elevated light rail structure design, lighting, and signage. As also indicated in the Cultural Resources analysis, for the Kenilworth Lagoon, the visual impacts caused by the project's design and the measures appropriate to mitigate them will be detailed in the 106 agreement.

Where appropriate, construction related mitigation measures will include elements such as locating staging areas in places not viewable by trail users or by otherwise incorporating visually screening, preservation of existing vegetation to the extent possible, implementation of dust suppression efforts, shielding of nighttime construction lights, continuous cleanup of trash and debris, and timely restoration of areas disturbed during construction.

7. References

U.S. Department of Transportation, Federal Highway Administration (FHWA). 1988. *Visual Impact Assessment for Highway Projects* (FHWA-HI-88-054).

Attachment J-1.1
Visual Resources Exhibits



SOUTHWEST Green Line LRT Extension

Southwest LRT Supplemental Draft EIS

Key View Point Locations
Eden Prairie Segment

Exhibit J-1

NORTH

0 750 1,500
Feet

METROPOLITAN COUNCIL

View looking southwest from Technology Drive at Mitchell Road toward proposed right of way along southern edge of Technology Drive.

SOUTHWEST Green Line LRT Extension	Southwest LRT Supplemental Draft EIS **Viewpoint 1** View Looking Southwest from Technology Drive at Mitchell Road Eden Prairie Segment	Exhibit J-2	METROPOLITAN COUNCIL

View looking southwest from Technology Drive toward the proposed right of way on the southern edge of Technology Drive where it would pass in front of the Optum Health Services Headquarters.

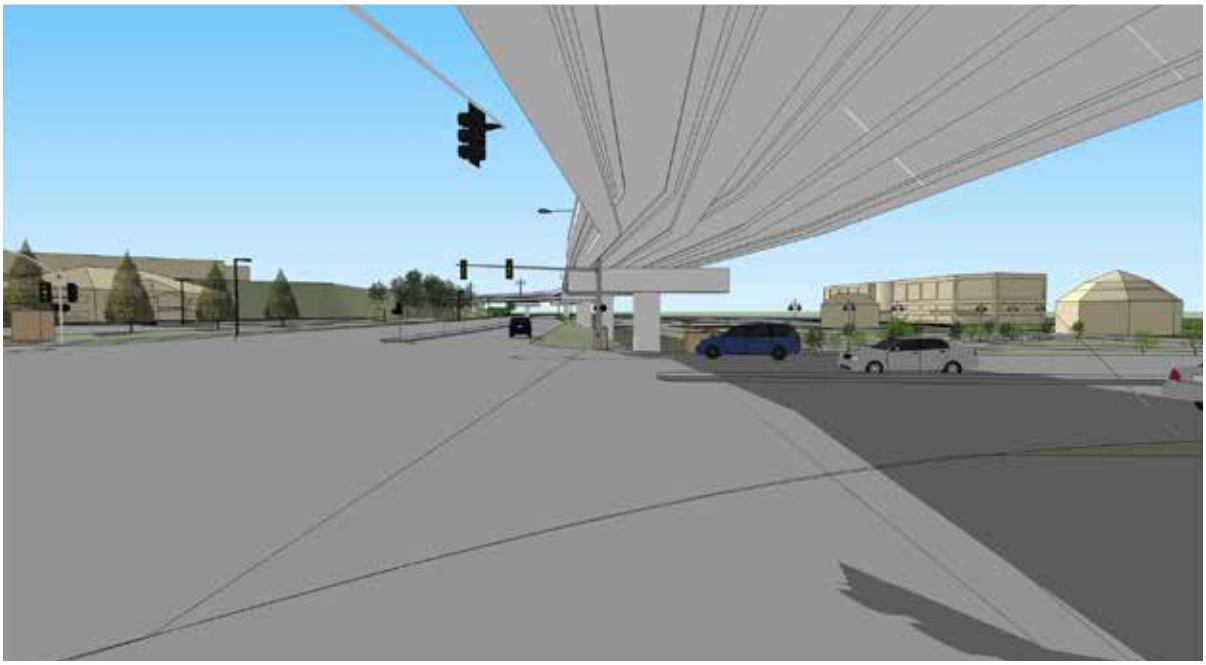
SOUTHWEST Green Line LRT Extension	Southwest LRT Supplemental Draft EIS **Viewpoint 2** View Looking Southwest along Technology Drive in front of the Optum Health Services headquarters Eden Prairie Segment	Exhibit J-3	METROPOLITAN COUNCIL

View looking north from the Purgatory Creek Trail toward the proposed right of way on the southern edge of Technology Drive.

SOUTHWEST Green Line LRT Extension	Southwest LRT Supplemental Draft EIS **Viewpoint 3** View from the Purgatory Creek Trail Looking North Eden Prairie Segment	Exhibit J-4	METROPOLITAN COUNCIL

View looking east from Technology Drive toward the proposed right of way where it would pass along the southern edge of Technology Drive, cross Technology Drive, and then pass along the west side of the SouthWest Transit Center. A new parking ramp and the station platform will extend from the existing Transit Center structures into the landscaped area now visible just beyond the driveway located between the condominium complex and the Transit Center.

a. Photograph of the existing view looking south along Prairie Center Drive at Technology Drive toward the proposed alignment of elevated LRT structure.



b. Preliminary rendering of the view showing a possible design for the elevated LRT structure that would be developed as part of the LRT project.

Note: This image has been prepared to illustrate the alignment for the Supplemental Draft EIS and is based on preliminary engineering designs that are subject to change. See Chapter 2 of this Supplemental Draft EIS for a description of the alignment illustrated in this image.

SOUTHWEST	Southwest LRT Supplemental Draft EIS **Viewpoint 5** View Looking South along Prairie Center Drive at Technology Drive Eden Prairie Segment	Exhibit J-6	METROPOLITAN COUNCIL

a. Photograph of the existing view from the east side of Prairie Center Drive looking west toward the proposed alignment of elevated LRT structure and Purgatory Creek Park.

b. Preliminary rendering of the view showing a possible design for the elevated LRT structure that would be developed as part of the LRT project.

Note: This image has been prepared to illustrate the alignment for the Supplemental Draft EIS and is based on preliminary engineering designs that are subject to change. See Chapter 2 of this Supplemental Draft EIS for a description of the alignment illustrated in this image.

SOUTHWEST	Southwest LRT Supplemental Draft EIS **Viewpoint 6** View From East Side of Prairie Center Drive Toward Purgatory Creek Park Eden Prairie Segment	Exhibit J-7	METROPOLITAN COUNCIL

a. Photograph of the existing view from the parking lot in front of the picnic pavilion in Purgatory Creek Park looking east toward the proposed alignment of elevated LRT structure.

b. Preliminary rendering of the view showing a possible design for the elevated LRT structure that would be developed as part of the LRT project.

Note: This image has been prepared to illustrate the alignment for the Supplemental Draft EIS and is based on preliminary engineering designs that are subject to change. See Chapter 2 of this Supplemental Draft EIS for a description of the alignment illustrated in this image.

a. Photograph of the existing view looking north along Prairie Center Drive just south of the proposed location of the elevated LRT structure's crossing of the roadway.

b. Preliminary rendering of the view showing a possible design for the elevated LRT structure that would be developed as part of the LRT project.

Note: This image has been prepared to illustrate the alignment for the Supplemental Draft EIS and is based on preliminary engineering designs that are subject to change. See Chapter 2 of this Supplemental Draft EIS for a description of the alignment illustrated in this image.

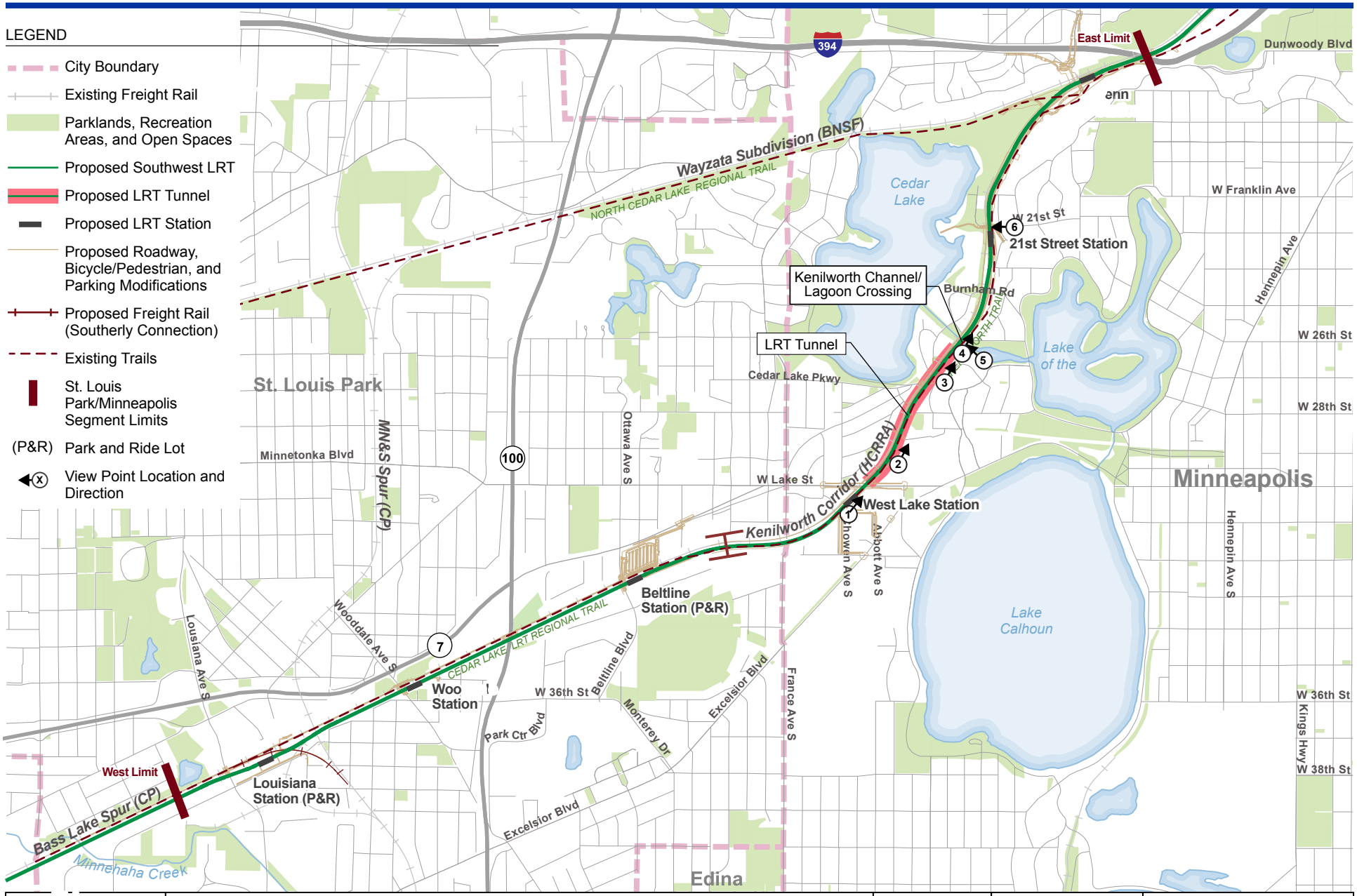
SOUTHWEST	Southwest LRT Supplemental Draft EIS **Viewpoint 8** View North Along Prairie Center Drive South of Proposed Elevated Crossing of Roadway Eden Prairie Segment	Exhibit J-9	METROPOLITAN COUNCIL

View from Eden Road looking west toward the proposed right of way that would pass along the north side of the road and into the undeveloped area by the water tower north of the Town Center Market Place.

SOUTHWEST Green Line LRT Extension	Southwest LRT Supplemental Draft EIS **Viewpoint 9** View from Eden Road Looking West Eden Prairie Segment	Exhibit J-10	METROPOLITAN COUNCIL

View looking south from Valley View Drive toward proposed route of elevated segment of the LRT that would cross Valley View Drive and continue along the north side of Flying Cloud Drive

SOUTHWEST Green Line LRT Extension	Southwest LRT Supplemental Draft EIS **Viewpoint 10** Valley View Drive, View Looking South Toward Intersection with Flying Cloud Drive Eden Prairie Segment	Exhibit J-11	METROPOLITAN COUNCIL



SOUTHWEST Green Line LRT Extension

Southwest LRT Supplemental Draft EIS

Key View Point Locations

St. Louis Park/Minneapolis Segment

Exhibit J-12

NORTH

0 1,325 2,640

Feet

METROPOLITAN COUNCIL

View northeast from South Chowen Avenue toward the existing rail and trail corridor and the proposed alignment of the LRT and the location of the West Lake Station.

SOUTHWEST Green Line LRT Extension	Southwest LRT Supplemental Draft EIS **Viewpoint 1** View northeast from South Chowen Avenue toward the existing rail and trail corridor St. Louis Park/Minneapolis Segment	Exhibit J-13	METROPOLITAN COUNCIL

a. Photograph of the existing view looking north along the trails and freight line at a point just north of West Lake Street.

b. Preliminary rendering of the view after project construction. The LRT is not visible because it would be underground. Excavation during construction could require clearing of trees along the right side of the trails, initially opening up the view toward the apartment tower complex.

Note: This image has been prepared to illustrate the alignment for the Supplemental Draft EIS and is based on preliminary engineering designs that are subject to change. See Chapter 2 of this Supplemental Draft EIS for a description of the alignment illustrated in this image.

a. Photograph of the existing view from the trails at a point just north of Cedar Lake Parkway looking north toward the proposed tunnel portal south of the Kenilworth Channel/Lagoon Crossing.

b. Preliminary rendering of the view depicting the proposed light rail at the portal transition from the tunnel to the surface and the channel crossing.

Note: This image has been prepared to illustrate the alignment for the Supplemental Draft EIS and is based on preliminary engineering designs that are subject to change. See Chapter 2 of this Supplemental Draft EIS for a description of the alignment illustrated in this image.

SOUTHWEST	Southwest LRT Supplemental Draft EIS **Viewpoint 3** View From a Point North of Cedar Lake Parkway Looking North Toward the Tunnel Portal South of the Canal Crossing St. Louis Park/Minneapolis Segment	Exhibit J-15	METROPOLITAN COUNCIL

a. Photograph of the existing view looking north from the trails at a point just south of the Kenilworth Channel/Lagoon Crossing.

b. Preliminary rendering of the view with the addition of the proposed crossing of the channel, which would include light rail tracks, freight rail tracks (partially obscured by safety and deterrent fences), as well as bicycle and pedestrian trails.

Note: This image has been prepared to illustrate the alignment for the Supplemental Draft EIS and is based on preliminary engineering designs that are subject to change. See Chapter 2 of this Supplemental Draft EIS for a description of the alignment illustrated in this image.

a. Photograph of the existing view looking northwest from the Kenilworth Channel/ Lagoon toward the freight rail and trail trestle bridges.

b. Preliminary rendering of the view with the addition of the proposed crossing structure that could be developed as a part of the LRT project.

Note: This image has been prepared to illustrate the alignment for the Supplemental Draft EIS and is based on preliminary engineering designs that are subject to change. See Chapter 2 of this Supplemental Draft EIS for a description of the alignment illustrated in this image.

View northwest of West 21st Street at Thomas Avenue, looking west toward the Kenilworth Corridor, which includes an existing freight rail and trail alignment and which would include the proposed light rail alignment and 21st Street Station.

SOUTHWEST Green Line LRT Extension	Southwest LRT Supplemental Draft EIS **Viewpoint 6** View northwest from West 21st at Thomas Avenue toward the existing rail and trail corridor St. Louis Park/Minneapolis Segment	Exhibit J-18	METROPOLITAN COUNCIL

Attachment J-2
Federal Highway Administration - Visual Impact Assessment for Highway Projects

U.S. Department
of Transportation

**Federal Highway
Administration**

Office of Environmental Policy

Visual Impact Assessment for Highway Projects

Publication No. FHWA-HI-88-054

U.S. Department
of Transportation

**Federal Highway
Administration**

Visual Impact Assessment for Highway Projects

Office of Environmental Policy
Washington, D.C.

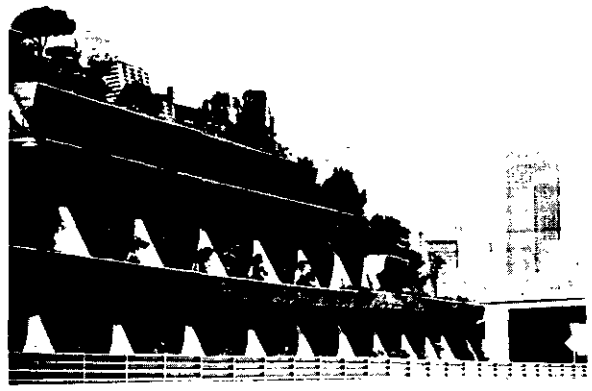
(FHWA-HI-88-054)

TABLE OF CONTENTS

1 INTRODUCTION

This field guide is intended to help those who prepare or review the coverage of visual impacts in environmental assessments or impact statements for highway projects. This guide will discuss how to develop such coverage and how to review its adequacy.

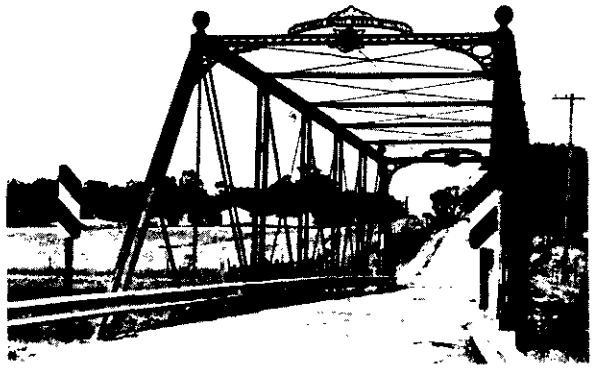
Many State highway agencies have been changing the emphasis of their programs from Interstate construction to the rehabilitation and upgrading of existing roads. It is usually obvious that constructing a new urban freeway will have a significant visual effect, positive or negative, on surrounding areas. It may be less clear whether visual considerations will be important in widening a road or reconstructing a bridge. In fact, experience has shown that visual considerations can sometimes be critical on such projects. This field guide will present an approach to identifying the potential importance of visual effects and then assessing the nature of these effects. Within the framework of this approach, the choice of specific assessment techniques should be tailored to the project in terms of appropriate detail and level of effort. It appears neither necessary nor desirable to apply the elaborate assessment process that is appropriate for a large project to a small project that will have only modest visual effect.



Visual considerations can be a strong influence in the design of major urban highway structures such as this retaining wall.

DOCUMENTING AND REVIEWING VISUAL IMPACTS

A visual impact assessment for a large and controversial highway project may be a considerable undertaking and may require a sizable report to explain the approach and its results. While this report may be a necessary and useful element of the environmental studies for a highway project, it will be too detailed for the Environmental Impact Statement (EIS) itself. The project EIS should be strictly limited in length and should cover only those environmental issues which have a significant bearing on project decisions.



Visual considerations may also be important in deciding how to repair or replace a minor bridge that has historic value.

While the full visual impact assessment report might be included in an EIS appendix, the EIS itself should contain only the findings on significant visual issues and the evidence sufficient to substantiate the findings. Given the limit of 150 pages for a typical EIS," coverage of visual impacts will be limited to a few pages on all but the most controversial projects. The visual assessment information for a finding of no significant impact (FONSI) must also be concise. In both cases, the narrative text should briefly describe the principal visual characteristics of the project, the visual resources and viewers affected, the significance of the main visual issues, the

effects of the project alternatives, and any mitigation measures. The scoping procedure suggested in this guide can be useful in the development of this assessment.

Much of the coverage of visual impacts should be graphic; visual effects are best conveyed visually. Graphic exhibits that are particularly helpful include the project viewshed, photographs of key views, and illustrations of the project's effect on these views. Techniques for developing these exhibits are discussed in this field guide.

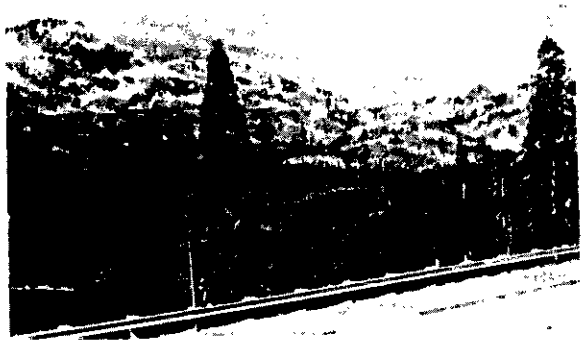
From a reviewer's perspective, visual impact coverage should contain enough information about the visual characteristics of the project, the people who will view the project, and the visual resources of the project area to support the findings of significance and effect. Evaluations should be supported by factual descriptions and illustrations; for example, an assertion that existing visual resources in the project area are "low in visual quality" should be preceded by a short description of these resources and representative photographs. Proposed mitigation measures should be logically related to adverse visual impacts or offsetting beneficial effects.

The terminology of esthetics is not uniform and reviewers should not insist on the exact words used in this guide (alternative terms in current use are given in the glossary). Rather than look for specific words, reviewers should seek evidence that all the major potential areas of visual impact have been considered. Again, the scoping questionnaire discussed in Chapter Three provides an outline of these areas and may be used as a starting point for review.

WHY VISUAL CONSIDERATIONS ARE IMPORTANT FOR HIGHWAY PROJECTS

The public nature and visual importance of our highways require that visual impacts—positive as well as negative—be adequately assessed and considered when a highway project is developed. Community acceptance of the project may also be strongly influenced by its visual effects.

Project visual impacts are seen both in the view *from* the road and the view *of* the road. The importance of the first has long been recognized. In recreation surveys, Americans have repeatedly ranked pleasure driving on scenic roads as one of their favorite activities. Researchers have also shown that the view from the road is the basis for much of what we know about our everyday environment and for our mental image of the city. For this reason, community groups are rightly concerned with the visual character of the highways entering their town or city; first impressions count.

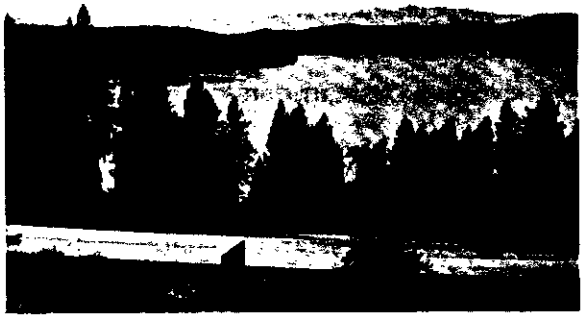


Americans often drive for the sheer pleasure of the view from the road.

On the other hand, the visual experience of entering our cities can be far from pleasant.

Systematic consideration of the view of the road is more recent. Particularly in urban or suburban areas, there may be many "eyes per mile" along the right-of-way of a proposed project. If existing views are very high in quality or are valued by large numbers of people, the visual costs borne by highway neighbors could outweigh the visual benefits accrued by highway users. In such cases, projects must be carefully planned to ensure that pleasing vistas for travelers are not developed at the expense of views from surrounding areas.

Public concern over adverse visual impacts can be a major source of project opposition. This is frequently true of urban viaducts and roadways in scenic areas, but other project types also generate controversy over their visual effects. Highway planners can help to resolve these controversies by assessing visual impacts and the effectiveness of mitigation measures in a clear and objective manner. This type of assessment can also help determine when actions that create positive visual impacts may reasonably be used to offset other adverse project effects.



Upgrading the highway to four lanes could have a significant effect on views of this outstanding scenic landscape.

Although many views of urban highways are not scenic, they may be important because of the number of "eyes per mile" that will see the road.

National policies direct that we carefully consider existing visual resources which are high in quality and that we enhance the built environment by good project planning and design. A systematic approach to visual impact assessment will help transportation agencies comply with these policies and achieve attractive highway projects that are appropriate to their viewers and visual settings.

WHAT FEDERAL LAWS AND REGULATIONS SAY ABOUT VISUAL CONSIDERATIONS

Federal legislation took its first notice of highway esthetics by protecting scenic road and parkway views. Billboards and junkyards along interstate and primary highways next drew attention. The initial funding for clean-up was followed by limited funding for roadside beautification. Up to this point, the mid-60's, the view from the road received all the attention.

The significance of the view of the road began to emerge with the Historic Preservation Act of 1966. This Act directs all federal agencies to account for the efforts of proposed projects on historic resources; the "criteria of adverse effect" include "the introduction of visual . . . elements that are out of character with the property or alter its setting." Coverage of the visual effects of highway projects was also recognized in 1966 by Section 4(f) of the Department of Transportation Act. It declares the national beauty of the countryside and public park and recreation lands, wildlife and waterfowl refuges, and historic sites." Highway projects can only cross these special lands if there is no feasible and prudent alternative and the sponsoring agency demonstrates that all possible planning to minimize harm has been accomplished. Visual resource mitigation may be required in certain instances as a part of this planning.

The National Environmental Policy Act of 1969 (NEPA) applied environmental awareness policies to all types of federally supported projects and all types of project settings. The Act declares that it is the "continuous responsibility" of the federal government to "use all practicable means" to "assure for all Americans safe, healthful, productive, and esthetically and culturally pleasing surroundings." The Act, of course, requires Environmental Impact Statements for major Federal actions which significantly affect the environment. It also directs agencies to use an interdisciplinary approach to "identify and develop methods and procedures... which will insure that presently unquantified environmental amenities and values may be given appropriate consideration in decision-making along with economic and technical considerations." It further

directs agencies to identify the means by which they will comply with NEPA.

The coverage of highway esthetics in Title 23 of the U.S. Code, which governs the Federal Highway Administration, was augmented to reflect NEPA's directives. Section 109(h) states that the project/environment balance point is the "best overall public interest." The costs of minimizing or eliminating the "destruction or disruption of manmade and natural resources," specifically including "esthetic values," must be considered in striking this balance. To further implement NEPA, Section 109(h) and Section 4(f), the Department of Transportation inaugurated its Design, Arts and Architecture in Transportation program in 1978. This program, outlined in DOT order 5610.1C, revised attachment 2, goes beyond the conservation of existing scenic resources and requires that environmental impact statements document the consideration of design quality in projects which involve public use areas or sensitive locations, such as parks or historic districts.

The Council on Environmental Quality (CEQ) published its final regulations for implementing the procedural provisions of NEPA in the same year. Lest esthetic values be construed as occuring only in wildlands or rural areas, the regulations direct that EIS discussion include "urban quality, historic and cultural resources, and the design of the built environment." To strengthen the relationship of the NEPA process to agency decision-making, the regulations encourage an early determination of EIS scope and of the environmental issues that are most significantly related to a decision among project alternatives. This important determination, called "scoping," can identify the potential significance of visual issues on a project, the nature of the particular visual issues, and the level of effort required for their resolution.

HOW THIS GUIDE CAN HELP IMPROVE HIGHWAY PROJECTS

The Federal Highway Administration has published this guide to help increase the responsiveness of highway planning and design to the national commitment to esthetic quality in federal projects. The guide attempts to achieve this goal by providing *technical assistance to people who prepare or review the coverage of visual effects in environmental assessments or impact statements. It is therefore oriented toward NEPA requirements, but the approach is also appropriate to Section 4(f) statements and to the determination of project visual effects on historic and archeological resources.*

More specifically, the objectives of this guide are to help readers:

- develop a basic understanding of the principles of esthetics and how they apply to highway planning and location;
- develop an ability to identify and evaluate location and design alternatives which minimize or eliminate adverse impacts on existing views and viewers, and which enhance the potential visual benefits of highway projects;
- develop an ability to prepare the coverage of positive and negative visual impacts in environmental assessments and impact statements, and/or to review the adequacy of such coverage.

The potential significance of visual effects depends not only on project type, but also on project setting. Moreover, federal laws and regulations require special consideration for the visual resources of certain settings. As we have already seen, these settings include parks, historic districts, and public use areas. The guide discusses how project visual impact assessments can respond to the issues posed by these special settings.

2 ESTHETICS AND VISUAL IMPACT ASSESSMENT

This chapter discusses the principles of esthetics that apply to visual impact assessment. It places esthetics and visual experience in the context of the National Environmental Policy Act, discusses how to identify the visual environment of a project, and examines the viewers and visual resources in that environment, including the highway itself.

The chapter outlines the principal esthetic considerations that should be addressed in a visual impact assessment. It also discusses each of these considerations in some detail. Readers examining this guide for the first time may wish to skim this chapter for basic concepts and return later to the detailed discussion of those concepts most at issue on a particular project.

ESTHETICS AND THE QUALITY OF VISUAL EXPERIENCE

The National Environmental Policy Act establishes the ground rules for the preparation of environmental impact statements. Visual effects are included within NEPA under the heading of esthetics. Therefore, we must understand what esthetics means within the context of NEPA before we can discuss how to adequately assess visual impacts.

Esthetics and NEPA

Esthetics is the *science or philosophy concerned with the quality of visual experience.* We cannot meaningfully assess project impacts on visual experience unless we consider both the stimulus and the response aspects of that experience. We will discuss these aspects separately, under the headings of "visual resources" and "viewers," to help keep the distinction clear.

We can use the word *quality* to refer simply to an attribute or characteristic of a subject. However, quality also can mean *excellence* or superiority in kind. Quality is used with this second meaning repeatedly in NEPA. The initial statement of need recognizes "the critical importance of restoring and maintaining environmental quality." To help meet this need, the Act declares a national goal to "enhance the quality of renewable resources" and directs the establishment of programs "to foster and promote the improvement of environmental quality." This NEPA language implies that esthetic assessments must not only describe the visual attributes of projects, but must also evaluate their effects on the relative excellence of visual experience.

The quality of visual experience depends in part on the characteristics of the visual resources that stimulate the experience.

The quality of visual experience also depends on the nature of the viewers: their location, number, activity, and values.

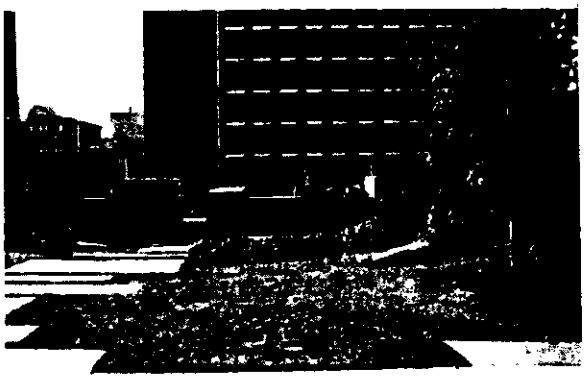
Three Levels of Project Esthetics

NEPA's emphasis on the quality of the overall environment has expanded the context in which we must assess project esthetics. Traditionally, visual design theory has followed the lead of the fine arts by looking at an individual project as a self-contained object, apart from its surroundings. Project esthetics have been judged by considerations like these: does the design visually express the project's functions? are the details visually consistent? do they support the total visual effect? We might summarize these and similar considerations as the *internal esthetics* of a project. This is the first level of project esthetics and is essential to a high-quality visual environment. It is also a principal focus of the Design, Art and Architecture in Transportation program that the U.S. Department of Transportation has instituted.

Internal esthetics: Seattle's Freeway Park is a well-detailed and internally consistent design with many delightful, self-contained spaces.

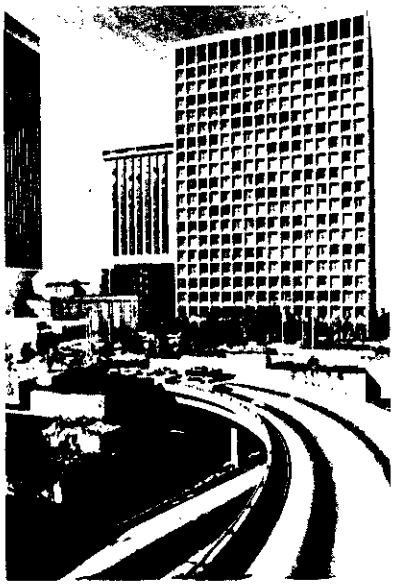
A second level of project esthetics considers the visual relationships between a project and specific elements of its surroundings: does the project contrast strongly?does it block existing views? We might call such considerations *relational* esthetics. They are the visual equivalent of good manners and can be very important to community acceptance of a project.

At the third and broadest level is *environmental* esthetics, to which NEPA particularly directs our attention. Here we must examine the esthetics of the total affected environment, of which any project is only a part: do project visual characteristics, however carefully designed and well mannered, enhance the quality of the environment? decrease it? or even affect it at all?



Relational esthetics: the forms and materials used in Freeway Park are also well-related to the rectilinear urban geometry of the city core.

In the past, much more attention has been given to the first level of esthetics than to the second and third levels. For this reason as well as the thrust of NEPA requirements, this guide will emphasize *how to assess visual relationships between highway projects and their surroundings and how to evaluate project effects on the quality of visual experience in the project environment*, as well as the internal esthetics of projects.

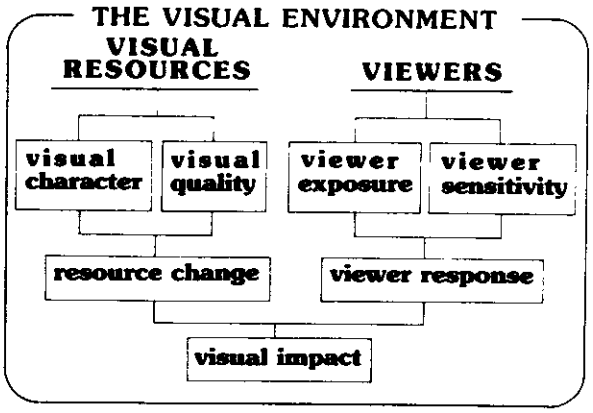


Environmental esthetics: the park is also an oasis of green that enhances the quality of the visual environment. It provides a handsome downtown entry and reconciles the differing visual orders of the freeway and the city center.

Visual Assessment Process

A generalized visual impact assessment process is illustrated in the accompanying diagram. This assessment process is similar in broad outline to the visual resource management (VRM) systems employed by

several major federal agencies. The major components of this process include establishing the visual environment of the project, assessing the visual resources of the project area, and identifying viewer response to those resources. These components define the existing or baseline conditions. We can then assess the resource change that would be introduced by the project and the associated viewer response; these allow us to determine the degree of visual impact.



These are the principal issues that a visual impact assessment should address; the relative importance of these issues will change from project to project.

HIGHWAY DECISIONS WITH ESTHETIC IMPLICATIONS

System Planning
- Design speed
- Capacity
- Access Control

Corridor/Location
- Alignment
  - horizontal
  - vertical
- Frontage roads
- Zoning
- Utility crossings
- Interchange location
- Intersections
- Joint development
- Urban vs. rural

Design
- Standards
- ROW width
- Sidewalks
- Pedestrian crossings
- Bikeways
- Erosion control
- Clearing limits
- Median width
- Signing
- Pavement surface
- Slope treatment
- Culverts
- Ditching
- Noise barriers
- Rest areas
- Stream relocation
- Structures
  - bridges
  - walls
- Shoulder treatment
- Sight distance
- Guardrail
- Median barriers
- Landscaping
- Fencing
- Grading
- Lighting
- Billboard control
- Junkyard screening

Maintenance
- Standards
- Mowing practices
- Litter pickup
- Painting
- De-icing practices
- Pavement maintenance
- Maintenance yards

Construction
- Temporary erosion control
- Clearing practices
- Borrow pit operation
- Clean up
- Waste areas

Operations
- Signing
- Pavement markings
- Lighting
- Traffic markings/lights
- Impact attenuators
- Delineators

3 SCOPING THE VISUAL IMPACT ASSESSMENT

SCOPING VISUAL IMPACTS

This guide has already shown that there are many different types of visual issues. For a few major projects, we may have to address all of them, but we need not adopt an "all or nothing" approach to visual impact assessment. Instead, we can apply the scoping concept to visual impacts and identify which visual issues, if any, require analysis for a given project. This chapter presents an "open question" approach for identifying significant visual issues. The questionnaire presented here can be used to help scope an EIS; it can also be used to guide the preparation of environmental assessments or to help identify the "extraordinary circumstances" under which environmental review is advisable for an otherwise excluded action. The questions, when properly analyzed, can serve as the primary basis upon which an esthetic or visual impact analysis can be written. They address those factors and esthetic considerations which are necessary in the development of an acceptable visual impact analysis. Although the questions can be self-serving in the visual impact assessment process, the remaining chapters in this field guide provide an explanation of the principles, evaluation techniques, and basic concerns which should be followed in analyzing the questions.

The questions are grouped under five main headings, discussed in the following paragraphs.

1 Project Characteristics

The first set of questions calls attention to project characteristics that may have a significant effect on project appearance. Alternatives may involve changes in these characteristics. For instance, a viaduct structure may be an alternative to a massive fill section across a low-lying area.

2 Visual Environment of Project

The next set of questions helps to identify and differentiate the visual environment of the project within the meaning of "affected environment" and "human environment" defined in NEPA regulations. The questions are intended to clarify the need for detailed analysis such as viewshed mapping.

3 Significant Visual Resource Issues

We can often identify the nature and likelihood of significant visual resource effects before we perform a detailed visual impact assessment. Sometimes visual resource effects are significant in themselves. For example, high visual quality is generally worth conserving wherever it exists. In most cases, however, the significance of these resource effects must be interpreted in combination with viewer response (the next set of questions).

For instance, the visual quality of an urban residential district may not be very high, but local residents may still value its visual character. On the other hand, highway projects are often related to urban improvement and redevelopment proposals; in these cases, community groups may be very concerned about improving the visual quality of urban travel routes by facility design and even the appropriate incorporation of art.

4 Significant Viewer Response Issues

Often, we can also identify the general nature of viewer response to a project before we undertake a detailed visual assessment, although the values and goals of local viewer groups may not become fully apparent until later in the process. For example, we can safely predict that residential and recreational viewer groups will be concerned about the appearance of their visual environment. We also know that various federal laws and regulations impose what we may call the test

of visual compatibility on projects located close to visual resources that are recognized for their cultural significance. Where this recognition is based on "scenic values," effects on visual quality will be equally important.

5 *Visual Impacts and Impact Management*

The last group of questions is intended to summarize the major visual effects—adverse or beneficial—that are likely to be associated with project alternatives. It is also intended to help identify potential visual mitigation measures for study in the assessment process. Mitigation can include avoiding, minimizing, and reducing impacts, as well as rectifying them or compensating for them. A mitigation measure should be related to a specific impact, or it may not only be ineffective, but may also compound the problem. For example, a color chosen to enhance the appearance of a bridge may prove incompatible with the surroundings of the bridge.

SCOPING QUESTIONNAIRE FOR VISUAL ASSESSMENTS

1. Project Characteristics

A. What are the major project design standards (capacity, access, speed, geometry)? Alternatives?

B. What is the typical highway cross-section (roadway, roadside slopes and drainage, right-of-way)? What major structures and appurtenances will be required? Alternatives?

C. Are any highway-related facilities (such as rest areas or maintenance yards) part of the project? What construction areas (borrow pits, spoil areas) will be needed? Alternatives?

D. What secondary effects (such as development at interchanges or conversion of land from rural to urban uses) may result from the project?

2. Visual Environment of Project

A. What landscape components (landform, water, vegetation, and manmade development) are characteristic of the regional landscape and the immediate project area?

B. Where is the project likely to be seen from?

C. What visually distinct landscape units can be identified within the immediate project area?

C. What levels of visual quality now exist (evaluated by criteria such as vividness, intactness, and unity or by other indicators) and how much would project alternatives affect these?

3. Significant Visual Resource Issues

A. How would the project alternative affect the landscape components which are present within the visual environment?

4. Significant Viewer Response Issues

A. What major viewer groups are likely to see the project?

B. What is the existing visual character of the project environment (e.g., form, line, color, texture and dominance, scale, diversity, continuity) and how compatible would project alternatives be with this character?

B. What is the viewer exposure to project alternatives for different groups (numbers, distance, duration and speed of view, etc.) and how would each alternative affect important existing views?

C. How are viewer activity and awareness likely to affect the attention that different groups pay to the project and its visual environment? Include both viewers from the road and of the road.

D. Are there any visual resources in the project environment that are particularly important to local viewers? Are there any districts, sites, or features that are regionally or nationally recognized for their cultural significance?

E. Is the project thought to threaten or support expectations for the future appearance of any areas it traverses?

5. *Visual Impacts and Impact Management*

A. In summary, what significant visual impacts, if any, appear likely? Include both adverse and beneficial impacts.

B. What alternatives might avoid, minimize, or reduce any adverse visual impacts and by how much?

C. What actions might rectify or compensate for adverse visual impacts and by how much?

SAMPLE SCOPING QUESTIONNAIRE

To help illustrate the use of the scoping questionnaire, we have completed an example for an urban freeway on new location.

Project Introduction

The project is a freeway spur that would provide access to the downtown core of a medium-sized western coastal city, as well as a bypass route for traffic bound to the north and east of the core. It includes a 1.3 mile link between a major interstate freeway to the south and limited access parkway to the north, with two interchanges in the core itself. The north-south leg would be located along a waterway that is the eastern boundary of the urban core. The project also includes a 2.3 mile east-west connection across the waterway, leading to industrial port lands. Project alternatives include alignment options to reduce adverse effects on a redevelopment area along the waterway and on an historic rail station.

SCOPING QUESTIONNAIRE FOR VISUAL ASSESSMENTS

1. Project Characteristics

A. What are the major project design standards (capacity, access, speed, geometry)? Alternatives?

- Two travel lanes in each direction, with up to 50,000 total ADT
- Fully controlled access
- 50 miles per hour design speed on mainline, 35 on ramps
- Minimum radius curves can be used

B. What is the typical highway cross-section (roadway, roadside slopes and drainage, right-of-way)? What major structures and appurtenances will be required? Alternatives?

- Mainline (2-lane) roadways = 42 feet
- Ramp (1-lane) roadways = 28 feet
- Right-of-way = 120 to 400 feet
- Waterway and river crossings: 340 feet (45 feet clear) and 400 feet (52 feet clear)
- All of N-S roadways, much of E-W roadways elevated on structure over railroad tracks (23 feet clear)
- Balance of roadway elevated on fill, 1½:1 side slopes
- Lighting and sign bridges required

C. Are any highway-related facilities (such as rest areas or maintenance yards) part of the project? What construction areas (borrow pits, spoil areas) will be needed? Alternatives?

- Possible joint-use beneath structures
- Potential uses include parking, outdoor storage, industrial use, and parks

D. What secondary effects (such as development at interchanges or conversion of land from rural to urban uses) may result from the project?

- Increased potential for redevelopment of downtown and adjacent waterway
- Possible urban deterioration immediately next to right-of-way

2. Visual Environment of Project

A. What landscape components (landform, water, vegetation, and manmade development) are characteristic of the regional landscape and the immediate project area?

- Landform: glacial terraces and small bluffs; estuarine deposits and landfill on valley floor
- Water: stream (partially culverted), river, waterway, sound
- Vegetation: weedy species on disturbed uplands, including blackberry and Scotch broom; lowland vegetation includes stands of red alder and black cottonwood;
- Manmade development: highrise office core, brick warehouse and railroad district, port industry, recreational marinas, hillside residential neighborhoods

B. Where is the project likely to be seen from?

- Existing city streets, existing freeway and parkway, and new highway itself
- Downtown core, historic warehouse and rail station district
- Waterway, new parks, new marinas
- Residential areas
- Industrial areas

C. What visually distinct landscape units can be identified within the immediate project area?

- Downtown core, warehouse and rail station district, waterway district, port industry area

3. Significant Visual Resource Issues

A. How would the project alternative affect the landscape components which are present within the visual environment?

- Landform: heavily modified hillside terraces and estuarine lowlands; little additional modification
- Water: stream valley at south end of corridor may be further disturbed; waterway and river would be crossed by bridges

- o Vegetation: stands of trees in stream valley and on lowland floor may be reduced in size
- o Manmade development: highway would require clearing some industrial buildings; brick warehouses would not be removed

B. What is the existing visual character of the project environment (e.g., form, line, color, texture and dominance, scale, diversity, continuity) and how compatible would project alternatives be with this character?

Prominent aspects of existing character include:

- o Form: hillside terraces and bluffs; buildings generally rectilinear, except rail station dome
- o Line: horizontal bluff edges, rail lines, waterway shore, roofs of warehouses
- o Diversity: very great, because of close juxtaposition of districts, and profusion of industrial structures and equipment
- o Continuity: relatively low, due to demolition and high proportion of vacant land

Project alternatives may or may not visually interrupt rail station dome, bluff and shore edges; may further increase diversity and decrease continuity

C. What levels of visual quality now exist (evaluated by criteria such as vividness, intactness, and unity or by other indicators) and how much would project alternatives affect these?

Existing visual quality is low in foreground, moderated by good background views of sound and mountains

- o Vividness: moderate due to rail station dome, waterway, towers in downtown core
- o Intactness: low, due to demolition, vacant land, and lack of maintenance
- o Unity: low, due to high diversity of development and lack of continuity

Project could adversely affect waterway and rail station; it could also improve intactness and unity, and thus improve overall visual quality significantly.

4. Significant Viewer Response Issues

A. What major viewer groups are likely to see the project?

- o Commuters, office workers and shoppers, recreational boaters, neighborhood residents, industrial workers

B. What is the viewer exposure to project alternatives for different groups (numbers, distance, duration and speed of view, etc.) and how would each alternative affect important existing views?

View from road: improved visibility of downtown for entering drivers (up to 50,000 daily) view duration approximately 30 seconds

View of road:

- o Neighborhood residents--several thousand, middleground to background, permanent view
- o Recreational boaters--several hundred (may increase significantly in future), foreground, intermittent view
- o Office workers and shoppers--several tens of thousands, foreground, intermittent view
- o Industrial workers--several thousand, middleground to background, intermittent view

Project may block views between rail station and waterway, downtown and waterway

C. How are viewer activity and awareness likely to affect the attention that different groups pay to the project and its visual environment? Include both viewers from the road and of the road.

View from the road: drivers will have clearer orientation, limited ability to focus on foreground

View of the road:

- o Residents may have high concern about effect of road on views
- o Recreational boaters and users of waterway, redevelopment area may also have high concern
- o Office workers and shoppers probably will have moderate to low concern
- o Industrial workers may be expected to have low concern

D. Are there any visual resources in the project environment that are particularly important to local viewers? Are there any districts, sites, or features that are regionally or nationally recognized for their cultural significance?

- o Rail station is on National Register and is important to community
- o Warehouse district around it is also important to community and may be eligible for Register
- o Waterway views are valued, where available
- o Tree stands in lowlands and in stream valley at south end of north-south leg are important to environmental groups

E. Is the project thought to threaten or support expectations for the future appearance of any areas it traverses?

Community is divided:

- Businessmen and most city officials anticipate project improving visibility of downtown and contributing to revitalization; project design could enhance downtown
- Widespread community concern over possible adverse visual effects on historic rail station and warehouse district; compatible design could reduce concerns
- Additional concern over possible adverse visual effects on redevelopment of waterway for commercial and recreation use

5. *Visual Impacts and Impact Management*

A. In summary, what significant visual impacts, if any, appear likely? Include both adverse and beneficial impacts.

Beneficial effects (potential):

- Improved visibility of downtown core
- Improved visual quality of city entry

Adverse effects (potential):

- Lower visibility of rail station and waterway
- Visual incompatibility between elevated road, rail station area, and waterway redevelopment
- Decreased visual quality of expected views of rail station area and waterway redevelopment (present views are low in visual quality)

B. What alternatives might avoid, minimize, or reduce any adverse visual impacts and by how much?

- Minimum profile elevated road could considerably decrease obstruction of views from rail station and waterway areas
- Lower profile could enhance compatibility of elevated road by making it appear continuous with bluff edge of first terrace

C. What actions might rectify or compensate for adverse visual impacts and by how much?

- Structural concepts, landscape development, and joint-use alternatives may enhance visual compatibility of elevated road somewhat and greatly improve general visual quality over present condition

4 THE VISUAL ENVIRONMENT

The NEPA requirement to consider the environmental effects of a project implies that we must first determine the environment that is affected. NEPA also requires us to compare the relative effects of project alternatives. Therefore, two related steps are necessary before we can assess the effects of a project on its visual environment:

- we must develop a framework for visual assessment that will help us compare project alternatives;
- we must define the physical limits of the visual environment that each alternative may affect.

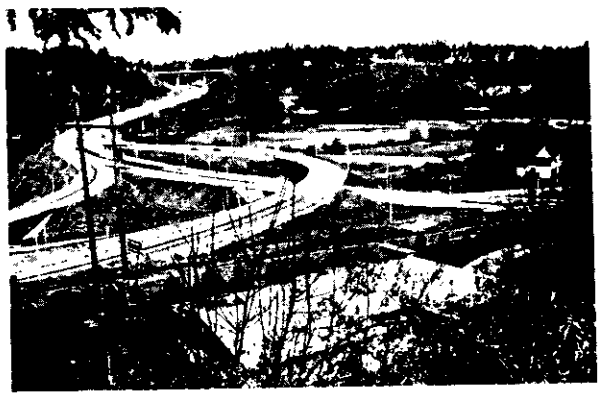
The concept of landscape classification enables us to establish the general visual environment of a project and its place in the regional landscape. Within this frame of reference, an analysis of project visibility can help us determine the limits of the actual or potential visual environment of the project.

The Landscape of the Geographic Region

The regional landscape can help us establish a frame of reference for comparing the visual effects of alternatives and determining the significance of these effects. In other words, we cannot assess the visual effects of a project unless we understand how the project's immediate visual environment is related to the visual environment of the geographic region. Characteristic combinations of *landscape components* distinguish one regional landscape from the next. Direct visual comparisons are only valid between landscapes with similar landscape components. The components of the regional landscape are its landform (or topography) and landcover; landcover components include water, vegetation, and manmade development.

Landscape types are relatively homogeneous combinations of landform and landcover that recur throughout a region. In the Puget Sound region, common landscape types include forested glacial plateaus, valley bottom farmlands, and the wooded but unstable bluffs between these two. Manmade landscape types can also be distinguished, such as the brick warehouse districts in the historic cores of many U.S. cities and the strip development along older urban highways. These natural and manmade landscape types may have visual implications for highway development. For instance, it may be considerably more difficult to fit a highway project unobtrusively into one landscape type than another. Roads that run across the grain of the landscape are particularly likely to cause visual problems.

To provide a framework for comparing the visual effects of highway project alternatives, we can divide the regional landscape (or specific portions of it) into distinct *landscape units*. These landscape units may be thought of as "outdoor rooms"; they will often correspond to places or districts that are already named. Units are usually enclosed by clear landform or landcover boundaries and



This highway route runs across the grain of landscape types: a deep cut scars the bluff and a massive fill blockades the valley floor.

many of the views within a landscape unit are inward-looking. Landscape units are usually characterized by diverse visual resources, too: several landscape types may be in view at any one time, just as we may see several walls of a room from one position. In other words, a landscape unit is perceived as a complete visual environment, while its landscape types are generally perceived as parts of that environment. The visual resources of project landscape units can be assessed and compared; the units can then be assigned priorities for planning, siting, and design decisions.

LANDSCAPE COMPONENTS

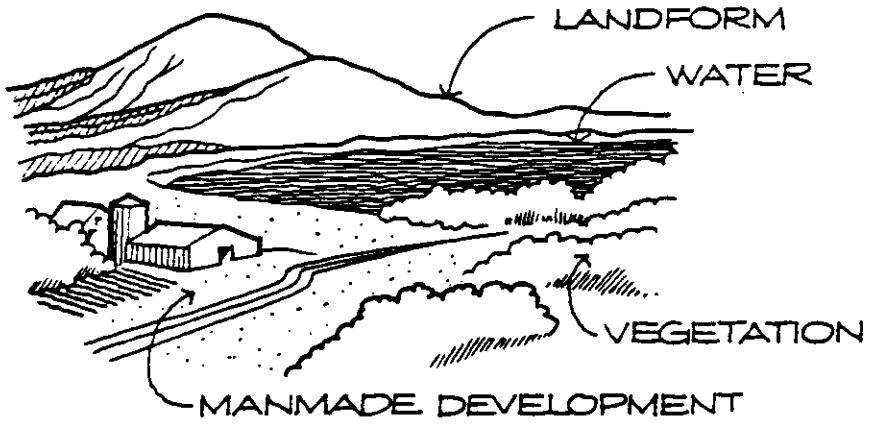
The underlying landform:

mountains, valley, beach

The landcover on it:

WATER

lake, river



VEGETATION

tundra, forest, crops

MANMADE DEVELOPMENT

house, barn, road

LANDSCAPE UNITS

Landscape Units are a framework for the assessment and management of visual resources and the effects of highway projects upon them.

Based on visual characteristics, and responsive to regional differences in these characteristics, **Landscape Units** are a tool for mapping "outdoor rooms."

The visual appearance of the landscape is dependent on the underlying landform and its landcover. Landscape types are homogeneous combinations of slope (landform surface) and landcover. Landscape types occur in more than one location and are generic within a region. Examples include "hillside hardwood forest" and "valley bottom industrial development".

LANDSCAPE TYPES
- multiple locations
- regional distribution
- usually unnamed
- visually homogeneous
- view orientation undefined

Landscape types combine to form specific landscape forms. These landform and landcover masses are geographically located and are often given place names (Bunker Hill is a named landform mass; Boston is a named landcover mass). They can also be classified into hierarchical systems on the basis of regional characteristics.

LANDSCAPE FORMS
- specific geographic location
- physical dimensions
- usually named
- heterogeneous visual elements
- view orientation varies

Landscape types and landscape forms combine to define visually bounded landscape units or "outdoor rooms". The spatial enclosure and visual interrelationships among the individual landscape types determine the visual character of the landscape unit. The edges dividing the unit from other landscape units are often defined by slope types, at watershed ridges and spatial constrictions.

SPATIALLY ENCLOSED LANDSCAPE UNIT
- geographic location
- visually bounded
- distinct landscape character
- interrelated but diverse visual elements
- high degree of intervisibility

In areas of vast spatial extent (characteristic of certain regions), the landscape unit may be the distant horizon. In this case, the landscape unit may consist of essentially a single homogeneous landscape type.

SPATIALLY UNENCLOSED LANDSCAPE UNIT
- geographic location
- visually unbounded
- distinct landscape character
- continuous, similar visual elements
- moderate degree of intervisibility

THE PROJECT VIEWSHED

The regional landscape establishes the general visual environment of a project. We can determine the precise limits of the visual environment by mapping the project *viewshed.* A viewshed is the surface area visible from a given viewpoint or series of viewpoints; it is also the area from which that viewpoint or series of viewpoints may be seen. Put another way, a viewshed is a tool for identifying the views that a project could actually affect. Viewshed mapping can go far to dispel exaggerated community fears over the visual effects of a project by accurately establishing which views have any potential of being affected. The extent of these views is often less than expected by the public. On the other hand, judgment must be exercised as to whether the area of assessment should extend to the farthest limits of the viewshed.

When a project involves location alternatives, each alternative may have its own viewshed. Often, these alternative viewsheds will include different landscape units. If the alternatives are all in the same valley, however, their viewsheds may be very similar. In such cases, as well as on existing roads, it can be useful to combine landscape unit and viewshed boundaries to define *visual assessment unit* as the visible portions of the landscape units through which the highway passes. Utilizing these composite units for evaluating and managing visual effects will help us limit our effort to the areas from which the highway may actually be seen. This approach is particularly well-suited for upgrading a road on its present location.

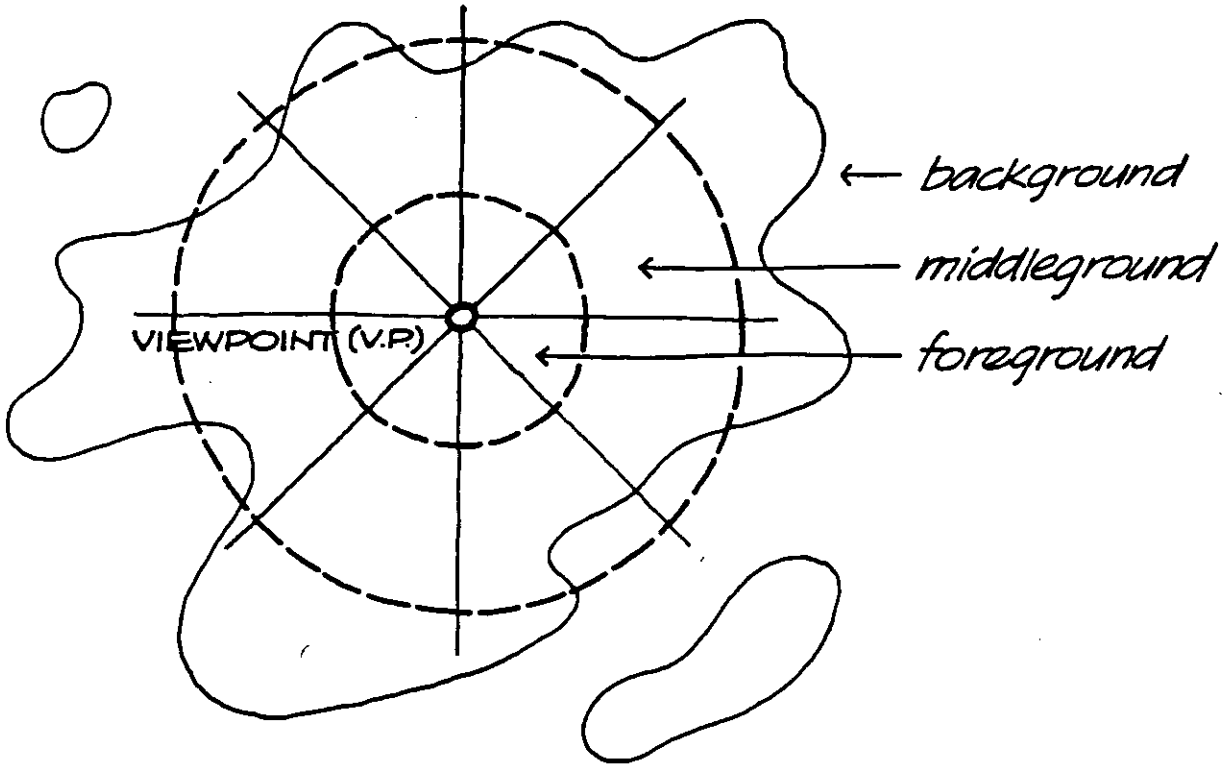
Viewsheds

KEY CONCEPTS

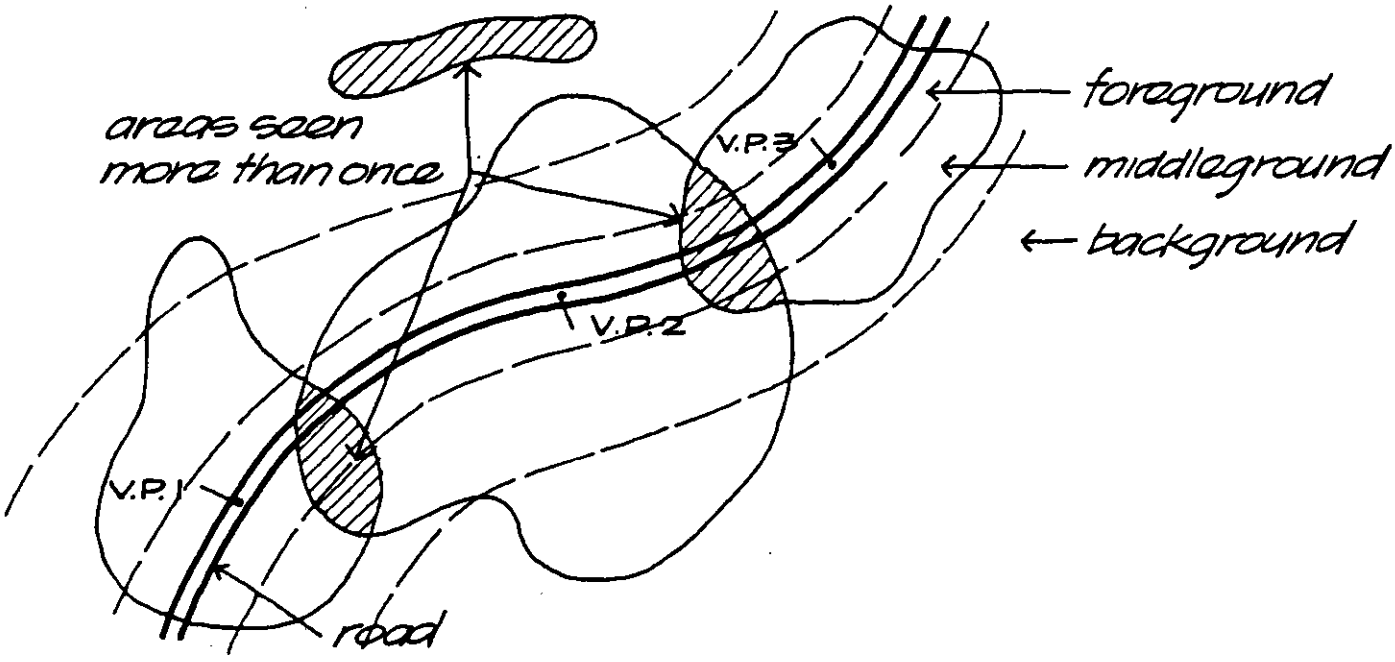
Viewshed:	1) All the surface area visible from an observer's viewpoint. 2) All the surface area from which the viewpoint is seen. Analogous terms: seen area, visible area.
Sightline:	The unobstructed line of sight between an observer and a viewed object.
Inter-visibility:	The principle that from any point visible to an observer, the observer can also be seen.
Observer viewpoint:	A point from which a selected view is analyzed and/or evaluated. Analogous concept: landscape control point (Litton).
Topographic (potential) viewshed:	The area which would be visible from a viewpoint based on landform alone, without the screening effect of vegetation and structures.
Composite viewshed:	The composite of overlapping areas visible from: 1) A continuous linear sequence of viewpoints along a road. 2) A network of viewpoints surrounding a road.
Visual Assessment Unit:	That portion of a landscape unit visible or potentially visible from a highway project or from which a highway project may be seen. To be useful in visual assessment the unit should be identified on the basis of visual distinctions, such as landscape unit boundaries or limit of visibility.

VIEWSHED MAPPING

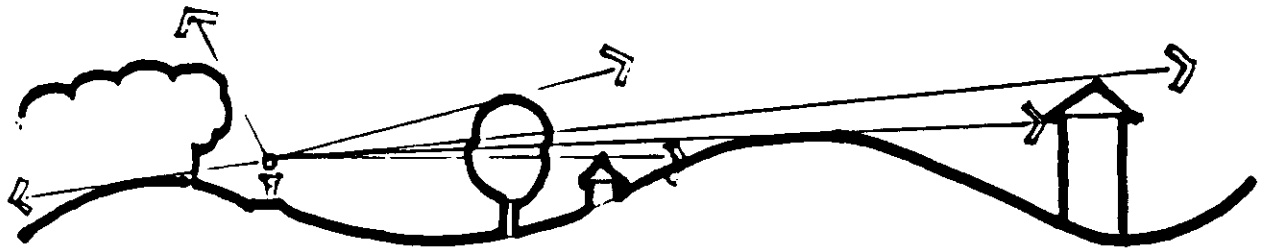
VIEWSHED FOR SINGLE VIEWPOINT



COMPOSITE VIEWSHED FOR MULTIPLE VIEWPOINTS

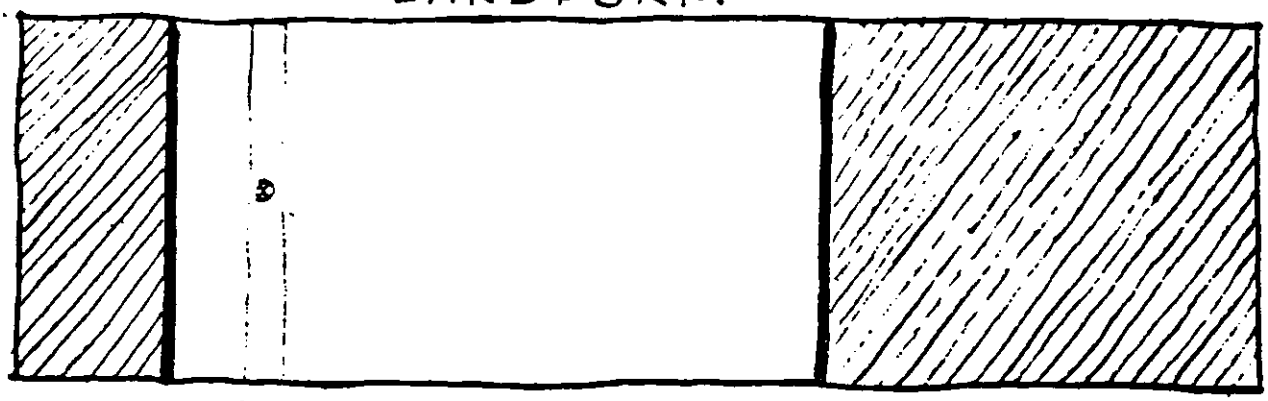


VIEWSHED MAPPING

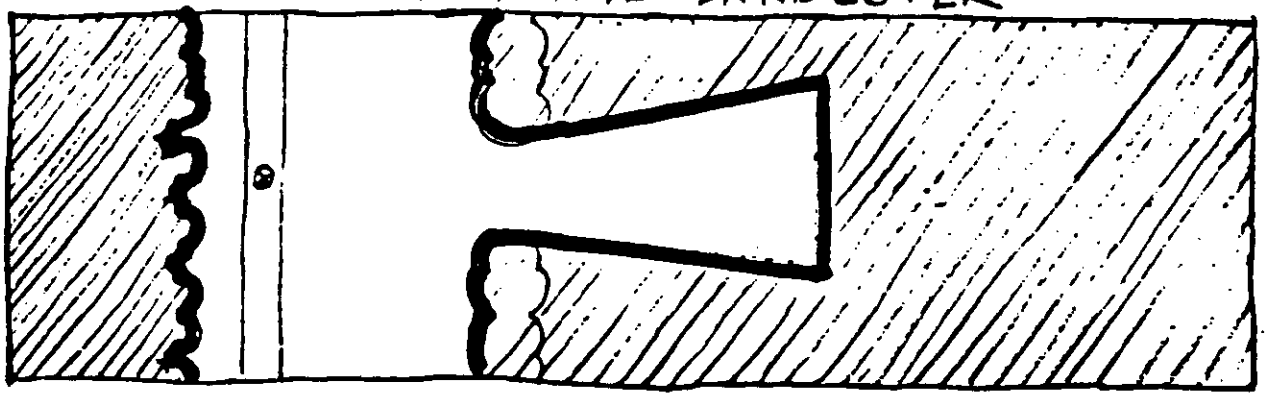


VIEWPOINT

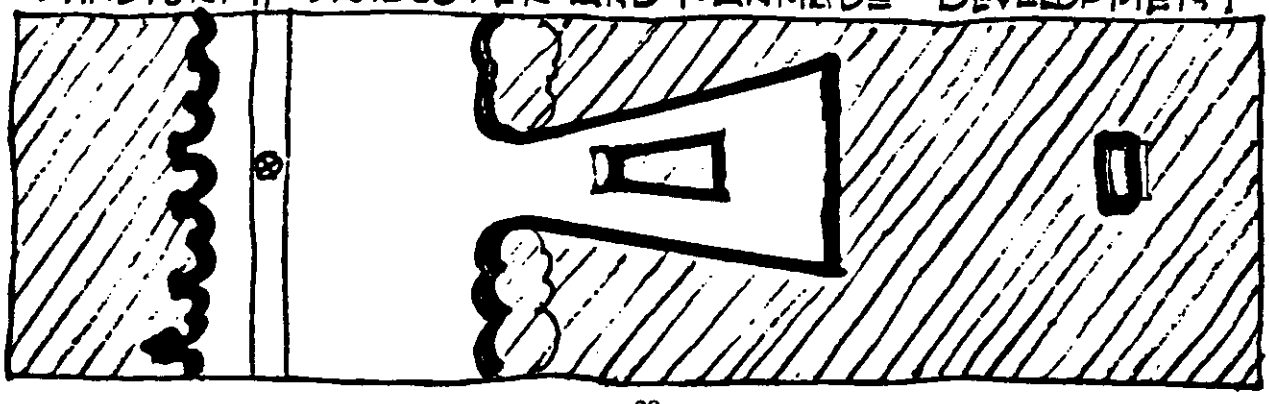
LANDFORM



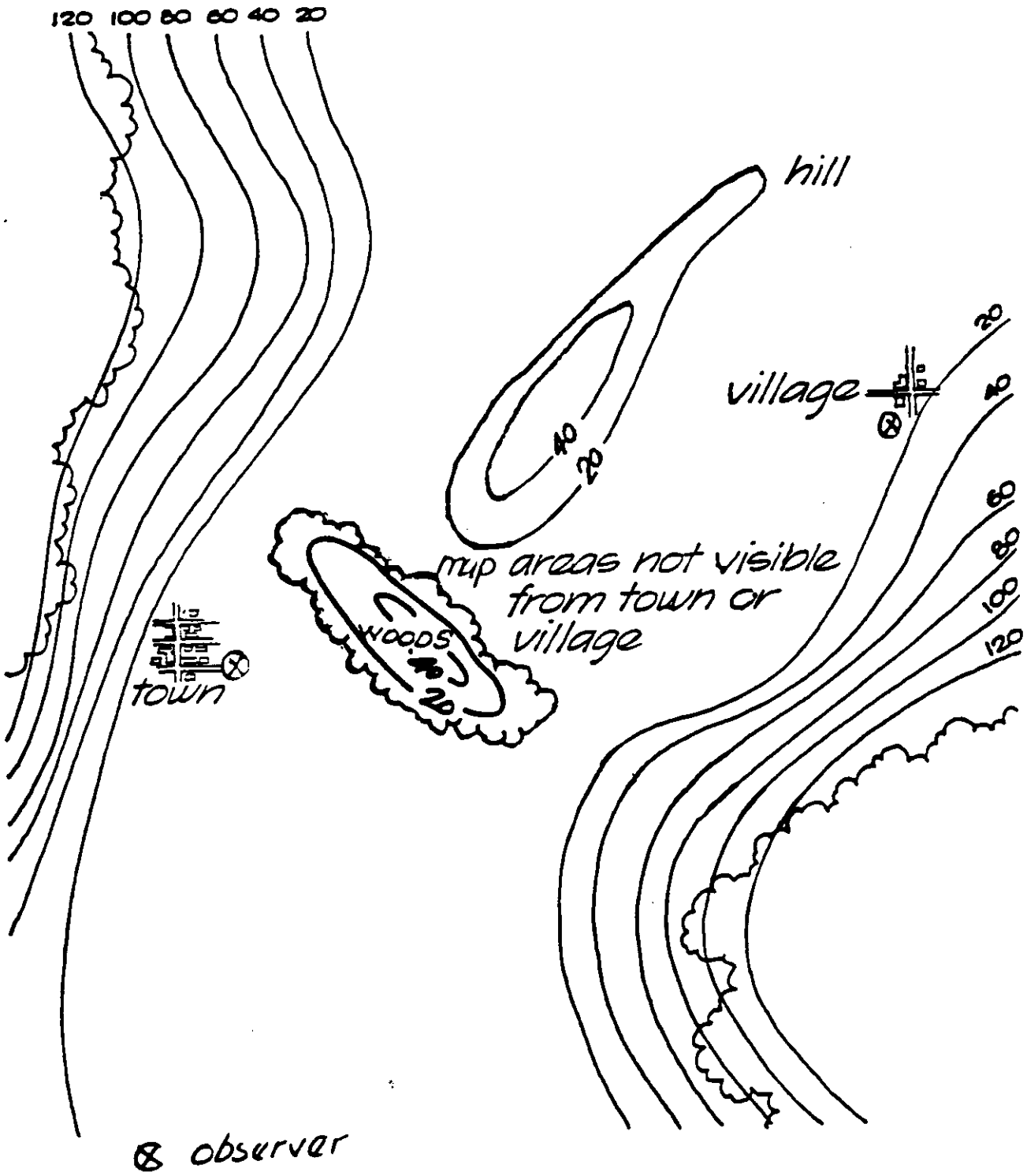
LANDFORM AND LANDCOVER



LANDFORM, LANDCOVER AND MANMADE DEVELOPMENT

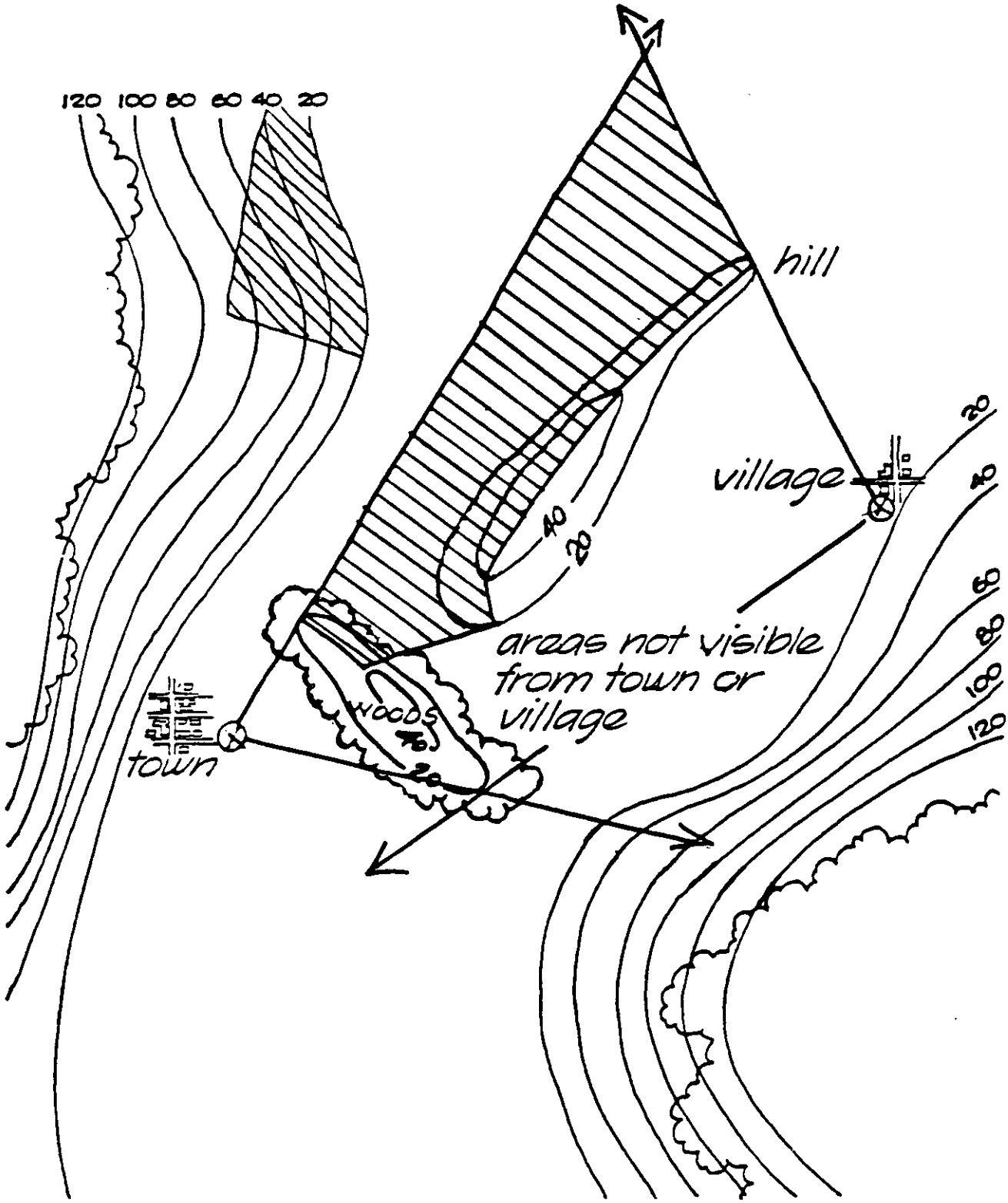


VIEWSHED EXAMPLE: Gravel Pit

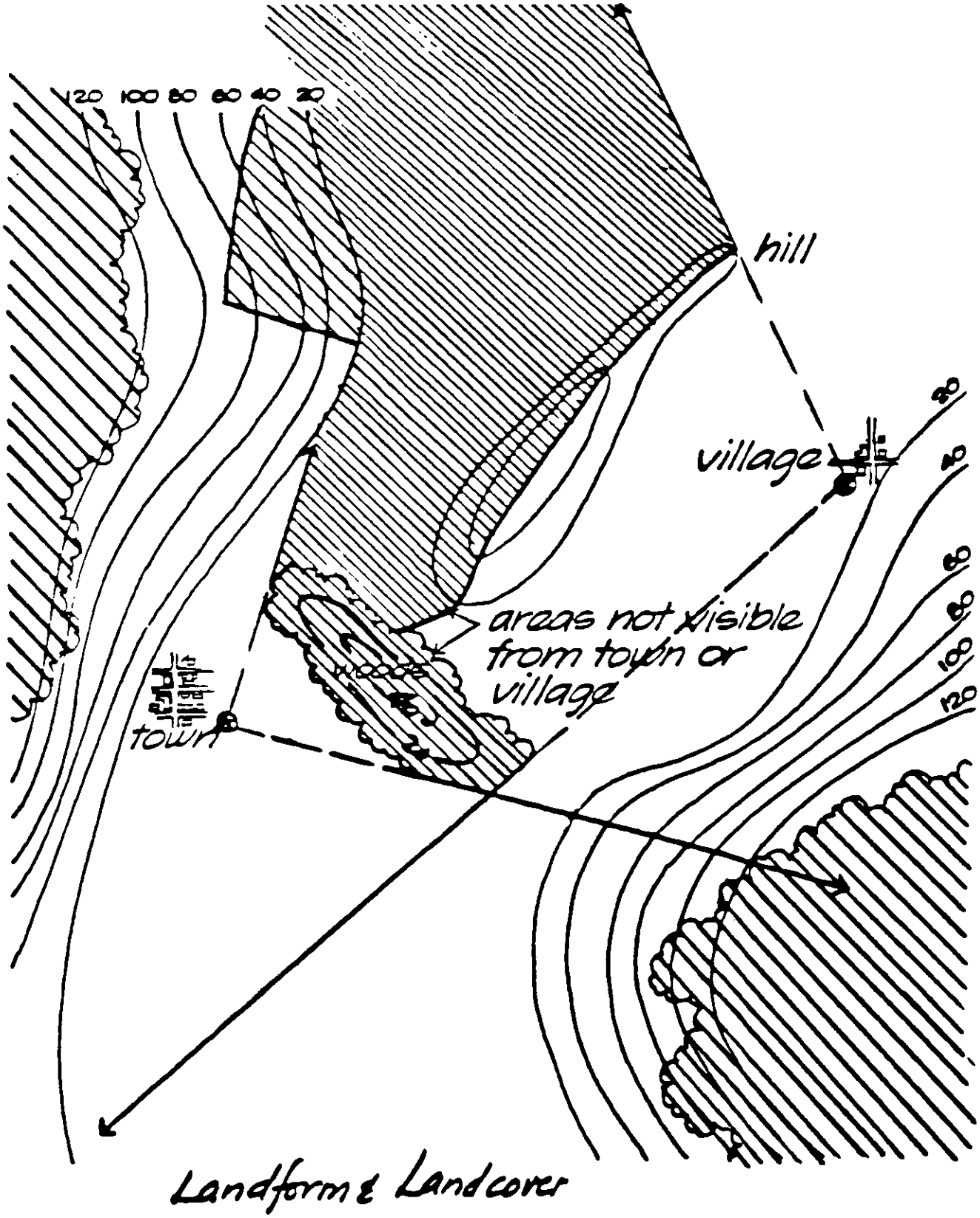


EXERCISE - map areas not visible from town or village
using ① landform constraints.
② landform and landcover constraints

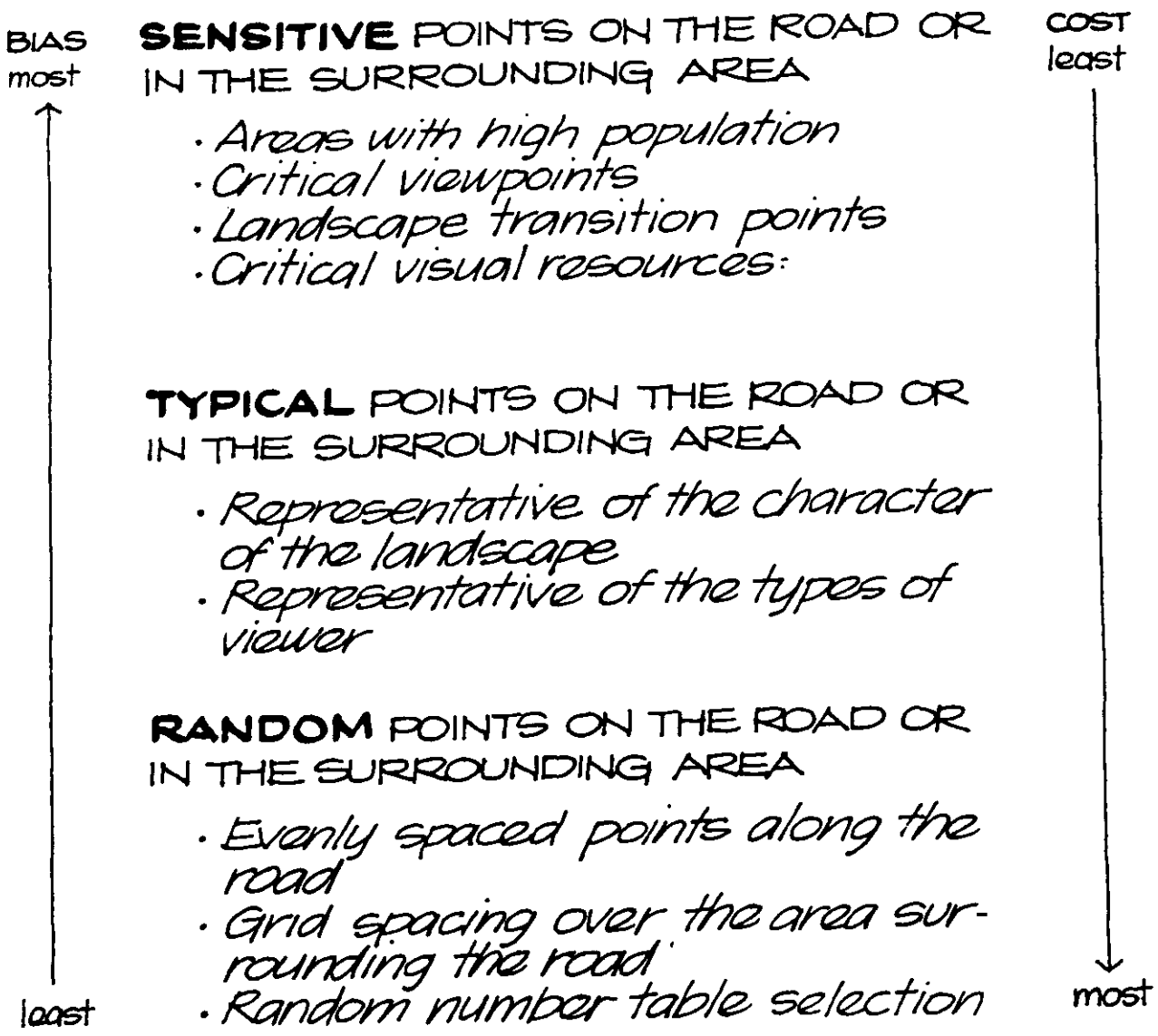
VIEWSHED EXAMPLE: Gravel Pit



VIEWSHED EXAMPLE: Gravel Pit



SELECTING OBSERVER VIEWPOINTS



VISUAL RESOURCES

The visual resources of a landscape are the stimuli upon which actual visual experience is based. A highway project can alter visual experience by changing the visual resource base. We must, therefore, be able to inventory the existing resources of the project visual environment and analyze their attributes before we can assess and manage visual impacts.

Visual Information

The visible components of a landscape—its landform and landcover—are its store of *visual information.* This is the basic data for the perception of objects in the landscape. An inventory of existing visual information, by landscape unit or visual assessment unit, will clearly display what we have to work with and will enable us to make basic comparisons of the visual effects of project alternatives. Specific inventory categories should derive from the regional landscape: its characteristic range of landforms, its types of water bodies, its vegetation communities, its land use and development types.

EXERCISE: INVENTORY

LANDSCAPE UNIT CHECKLIST: VISUAL INVENTORY AND ANALYSIS

Project Name _____ Evaluator _____
S.R. Number _____ Date _____
Assessment Unit _____ Weather _____
L/F District _____
L/F Section _____
L/F Province _____

	Visual Information (Perception)	Visual Character (Cognition)
	Resource Supply 3 High Prominence 2 Moderate Prominence 1 Present 0 Absent	
LANDFORM	___ Mountains ___ Steep Hills/Ridges ___ Rolling Hills ___ Undulating Land ___ Plateaus/Plains ___ Valleys ___ Cliffs, Bluffs ___ Points ___ Beaches ___	
Land Cover / WATER	___ Bays/Inlets ___ Rivers ___ Streams ___ Lakes ___ Ponds ___ Marshes ___ Waterfalls/Rapids ___	

	Resource Supply	Pattern Elements	Pattern Character
Land Cover VEGETATION	___ Coniferous Woods ___ Deciduous Woods ___ Scrubland ___ Grassland ___ Pasture/Croplands ___ Parks/Lawns ___ Street Trees ___ Agriculture ___		
Land Cover MANMADE DEVELOPMENT	___ Urban Centers ___ Suburban Areas ___ Industrial Areas ___ Commercial Areas ___ Institutional Areas ___ Residential Areas ___ Historic Features ___ Highways ___ Railroads ___ Utility Lines ___ Towers/Structures ___ Docks/Piers/Boats ___ Bridges/Dams ___ Parking/Storage Yard ___ Embankments/Cuts/ Pits ___ Billboards/Signs		

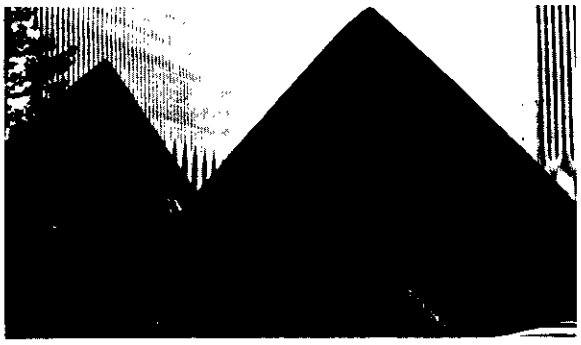
VISUAL CHARACTER

We do not simply experience the visual environment one object at a time; we experience the visual environment as an integrated whole. Our visual understanding or cognition of that environment is based on the *visual character* of objects and the relationships between these objects. The assessment of visual character is descriptive and not evaluative; that is, it is based on defined attributes that are neither good nor bad in themselves. Nevertheless, there can be strong public preference for the established visual character of a district and strong resistance to a project that would contrast with that character.

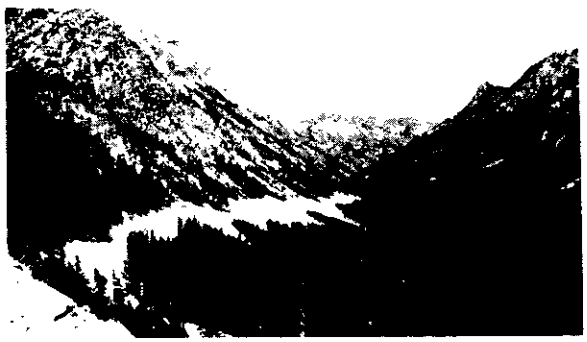
Descriptions of visual character can distinguish at least two levels of attributes: pattern elements and pattern character. Visual *pattern elements* are primary visual attributes of objects; they include form, line, color, and texture. The *form* of an object is its visual mass, bulk, or shape. *Line* is introduced by the edges of objects or parts of objects. The *color* of an object is both its value or reflective brightness (light, dark) and its hue (red, green). *Texture* is apparent surface coarseness. Our awareness of these pattern elements varies with distance. From afar, only the largest objects are seen as individual forms and we may see a city hillside as a textured surface. Distance also attenuates the intensity of colors.

The visual relationships between these pattern elements can be important secondary visual attributes of an object or an entire landscape. For example, there is a great difference between the visual character of a two-lane country road and an eight-lane freeway, although both may exhibit similar line, color, and texture. The visual contrast between a highway project and its visual environment can frequently be traced to four aspects of *pattern character:* dominance, scale, diversity, and continuity.

Specific components in a landscape may be visually *dominant* because of position, extent, or contrast of basic pattern elements. *Scale* is the apparent size relationship between a landscape component and its surroundings; an object can be made to look smaller or larger in scale by manipulating its visual pattern elements. Visual *diversity* is a function of the number, variety, and intermixing of visual pattern elements. *Continuity* is the uninterrupted flow of pattern elements in a landscape and the maintenance of visual relationships between immediately connected or related landscape components.



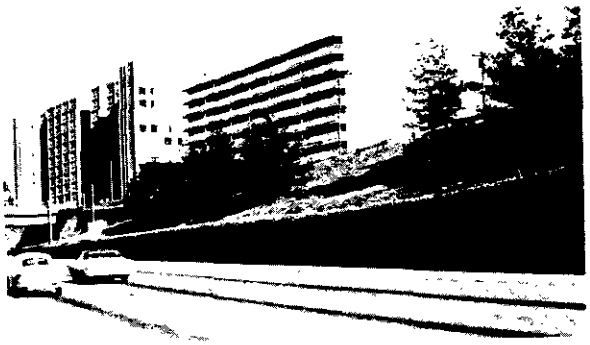
Visual character: form is the most prominent pattern element in this man-made setting.



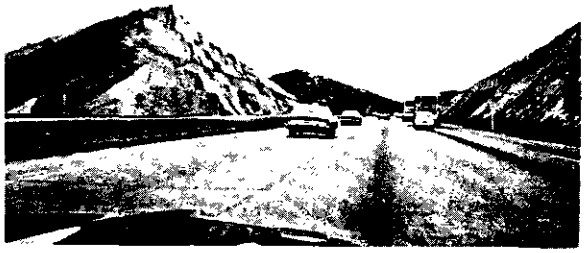
The horizontal line of this fresh highway cut contrasts with the characteristic diagonal lines in the natural landscape.

At a distance the individual structures in an urban district may merge into a relatively uniform visual texture.

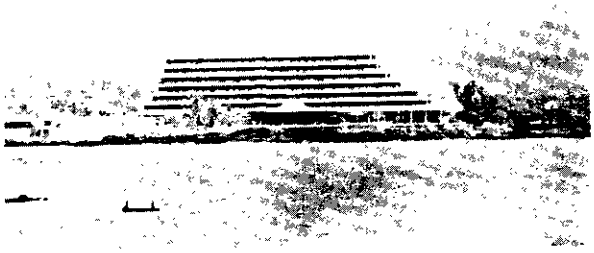
The forms, colors and textures of this street improvement project increase the diversity of this urban view.



The visual scale of this freeway segment harmonizes with the scale of its urban setting because of the relatively low retaining wall and the planted slope above it.

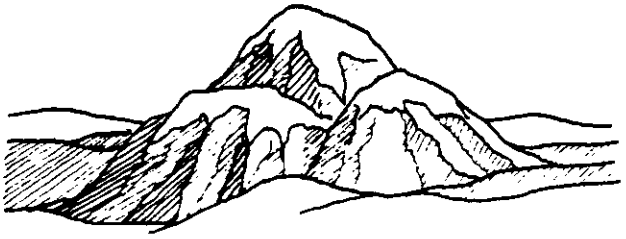


The visual continuity of this ridge is breached, perhaps unavoidably, by the highway.



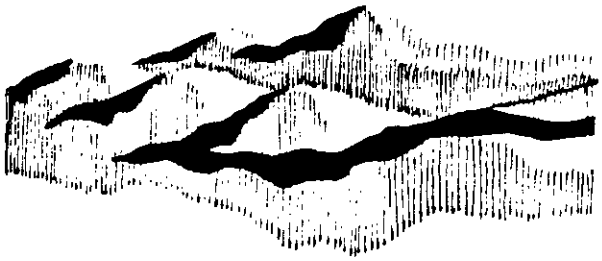
Visual character: this hotel is visually dominant because of a combination of pattern elements, including its form, color, and line—all in strong contrast with its setting.

VISUAL PATTERN ELEMENTS



Form
visual mass, bulk or shape of an object.

Line
horizons, silhouettes, edges of areas; man-made development.



Color
reflected hue (red, blue, yellow) and value (light and dark).

Texture
apparent courseness of visual surface.

LANDSCAPE COMPONENTS and VISUAL PATTERN

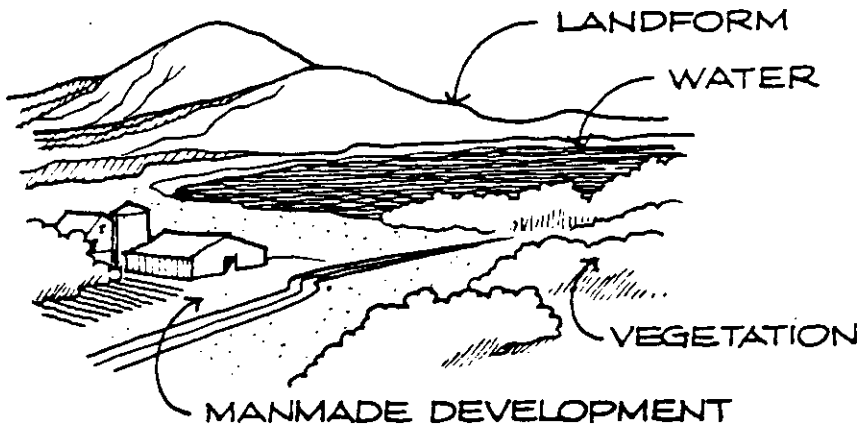
The underlying landform:

form and line

The landcover on it:

WATER

line and color (reflected light)



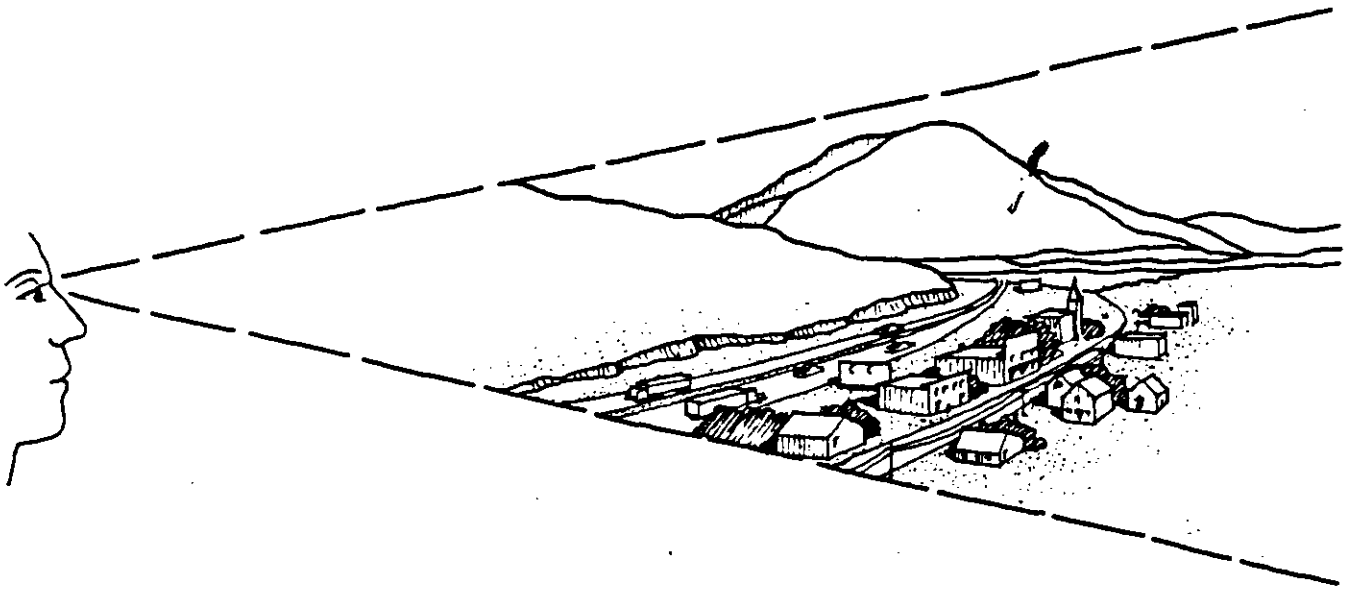
VEGETATION

color and texture

MANMADE DEVELOPMENT

form, line and color.

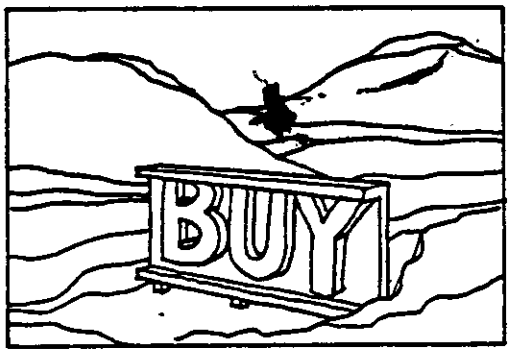
VISUAL CHARACTER



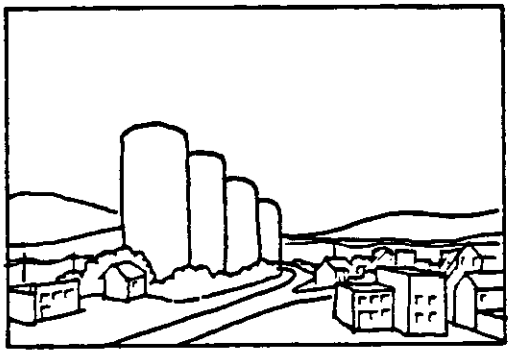
The character of the visible landscape can be objectively described.

PATTERN ELEMENTS CREATE	**PATTERN CHARACTER**
FORM	DOMINANCE
LINE	SCALE
COLOR	DIVERSITY
TEXTURE	CONTINUITY

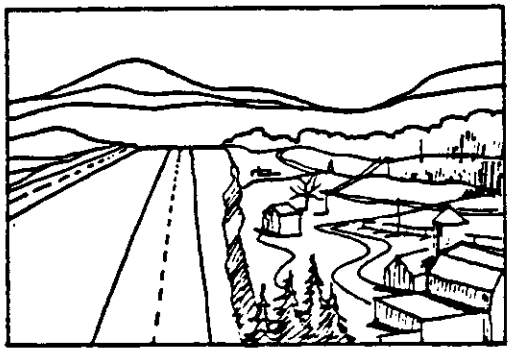
PATTERN CHARACTER



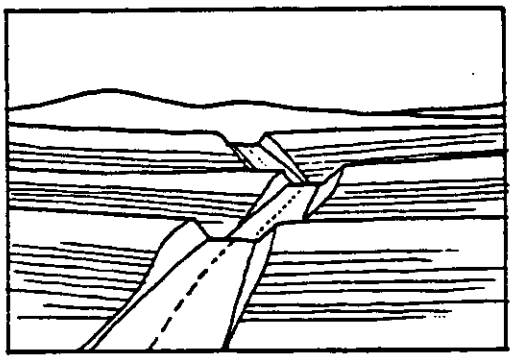
Dominance · Specific components in a scene may be dominant because of position, contrast, extent, or importance of their pattern elements. The sign is a dominant feature in this scene.



Scale · Apparent size relationships between landscape components and their surroundings; while overall size contributes, visual scale depends not only on overall size and position, but the pattern elements of a landscape component. The monolithic grain elevators are very large in scale compared to the town at their feet



Diversity · The number of pattern elements as well as the variety among them, and edge relationships between them; landscapes in which pattern elements are intermixed appear more diverse than landscapes with distinct boundries between types compare the right and left sides of this sketch.



Continuity · Uninterrupted flow of pattern elements, maintenance of visual relationships between immediately connected or related landscape components or features. In this sketch, highway gradients have been maintained at the expense of landform continuity

EXERCISE: INVENTORY

LANDSCAPE UNIT CHECKLIST: VISUAL INVENTORY AND ANALYSIS

Project Name _____
S.R. Number _____
Assessment Unit _____
L/F District _____
L/F Section _____
L/F Province _____

Evaluator _____
Date _____
Weather _____

Visual Information (Perception)	Visual Character (Cognition)	
	Pattern Elements 3 High Prominence 2 Moderate Prominence 1 Present 0 Absent	Pattern Character 3 High Prominence 2 Moderate Prominence 1 Present 0 Absent
	___ Form ___ Line ___ Color ___ Texture	___ Dominance of Landforms ___ Scale of Landforms ___ Diversity of Landforms ___ Continuity of Landform Pattern
	___ Form ___ Line ___ Color ___ Texture	___ Dominance of Waterforms ___ Scale of Waterforms ___ Diversity of Waterforms ___ Continuity of Waterform Pattern

Resource Supply	Pattern Elements	Pattern Character
	___ Form ___ Line ___ Color ___ Texture	___ Dominance of Vegetation ___ Scale of Vegetation ___ Diversity of Vegetation ___ Continuity of Vegetation Pattern
	___ Form ___ Line ___ Color ___ Texture	___ Dominance of Development ___ Scale of Development ___ Diversity of Development ___ Continuity of Development Pattern

VISUAL QUALITY

Esthetics is concerned not only with the character of visual experience, but also with its excellence. Where it exists, this excellence has both viewer and visual resource dimensions. The enjoyment or interpretation of experience can have many preferential and subjective components, yet there is clear public agreement that the visual resources of certain landscapes have high *visual quality* and that plans for projects in these areas should therefore be subject to careful examination.

On the level of visual information or visual character, such landscapes may have little in common. For instance, high visual quality is recognized in urban landscapes such as the New York skyline, as well as in natural landscapes such as the Grand Tetons. Both of these exhibit striking vertical relief, yet horizontal landscapes such as Cape Cod are also recognized for their high quality. Visual quality has often been tied to water, always nearby on Cape Cod, but desert landscapes such as Bryce Canyon are also noted for visual quality. Because of these differences in the character of the visual environment, a project in an area with high visual quality does not always have an adverse effect on that visual quality. How do we establish which landscapes have high visual quality and what is its basis?

Approaches to Assessing Visual Quality

Pragmatic approaches to answering these questions start with the recognition that Americans agree on the high visual quality of many landscapes. Some of these places are already officially designated—national parks and scenic rivers, for example. This may be considered proof of high visual quality, and a first approach to establishing the visual quality of a project area is simply to check for designated scenic areas. However, there is no comprehensive official process for identifying areas of high visual quality, nor does NEPA allow us to consider only superlative environments.

A second approach is to ask project viewer groups their visual preference for the principal landscape types in the project area. This approach has the virtue of directness and can avert challenge based on the potential difference between professional judgment and public opinion. However, it can also have its difficulties, including time, cost, and statistical validity, particularly when there are strong differences in values between local and regional viewer groups. Viewer preference techniques can be very useful for identifying areas to avoid during project location, but are not as helpful for devising and evaluating mitigation measures for areas the project cannot avoid crossing.

A third approach, used by several federal land-managing agencies, looks to the regional landscape for specific resource indicators of visual quality. High quality ratings are assigned to those landscape units which most clearly or dramatically exhibit the natural processes characteristic of the geographic region. Resource indicators of visual quality may be on the level of visual information (e.g., rock faces, avalanche cones) or visual character (e.g., variety). This approach has primarily been used for settings that are natural in appearance. It also tends to presume a region-wide visual analysis as a starting point and may be difficult to implement on a project-by-project basis.

A fourth approach to the evaluation of visual quality looks for indicators on the level of visual relationships rather than on the level of landscape components. A number of such relationships correlate well enough with public judgments of visual quality to predict those judgments. In other words, professionals can use these relationships as valid and reliable criteria for evaluative appraisals of visual quality. These criteria can be used within different geographic regions, as long as direct comparisons of visual quality are kept within the same region.

Vividness, Intactness, Unity

Several sets of evaluative criteria have been proposed and tested. One set that has proven useful includes three criteria: vividness, intactness, and unity. None of these is itself equivalent to visual quality; all three must be high to indicate high quality. *Vividness* is the visual power or memorability of landscape components as they combine in striking and distinctive visual patterns; Niagara Falls is a good instance. *Intactness* is the visual integrity of the natural and man-built landscape and its freedom from encroaching elements; this factor can be present in well-kept urban and rural landscapes, as well as in natural settings. *Unity* is the visual coherence and compositional harmony of the landscape considered as a whole; it frequently attests to the careful design of individual components in the landscape.

This evaluation approach can be particularly useful for highway project planning, since it does not simply presume that a highway project is an eyesore. It can also help identify effective ways of reducing specific adverse visual resource effects that are actually likely to occur.

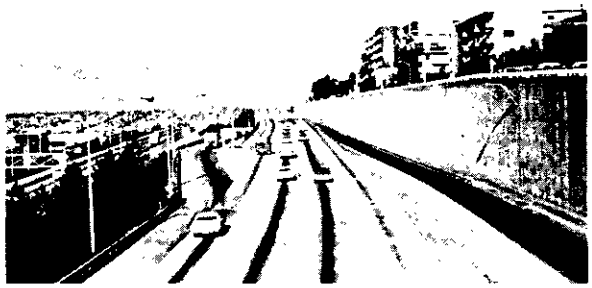
Whatever the approach to the evaluation of visual quality, direct validation by project viewer groups should be obtained whenever possible. Public opinion on visual quality issues can be included in the normal community involvement program. A full representative and random sample is generally not necessary; the point is to ensure that the assessors and the general public are on the same track. Some form of public participation, and validation of professional judgment, may be particularly important where legal challenge is a possibility.

We have identified the major factors in our experience of the visual environment and are now ready to examine some of the ways in which a highway project can affect this experience.

Visual quality: vividness or memorability is one of several criteria that can be used to help evaluate the visual quality of natural and manmade landscapes; the Manhattan skyline rates high on this criterion.

While the visual intactness and unity of this farm scene are both quite high, its overall visual quality is somewhat lower because it is not highly vivid.

A highway may also improve visual quality if it increases the unity and visual harmony of a landscape.



Large urban highways may disrupt the visual intactness of their city settings, lowering visual quality for highway neighbors.

Rio de Janeiro is a city recognized around the world for its high visual quality; the vivid combination of natural and urban forms, including transportation, is also characterized by high visual intactness of component elements and high visual unity in views such as this.

Visual Quality

KEY CONCEPTS

Visual Quality: While many factors contribute to a landscape's visual quality, they can conveniently be grouped under three headings: Vividness, Intactness and Unity. Analogous concepts: scenery quality rating (B.L.M.), variety class (U.S.F.S.)

Vividness: The memorability of the visual impression received from contrasting landscape elements as they combine to form a striking and distinctive visual pattern.

Intactness: The integrity of visual order in the natural and man-built landscape, and the extent to which the landscape is free from visual encroachment.

Unity: The degree to which the visual resources of the landscape join together to form a coherent, harmonious visual pattern. Unity refers to the compositional harmony or inter-compatibility between landscape elements.

$$\text{Visual Quality} = \frac{\text{Vividness} + \text{Intactness} + \text{Unity}}{3}$$

SAMPLE VISUAL QUALITY EVALUATION, LEVEL 3

VISUAL QUALITY EVALUATION - VIEW FROM THE ROAD

Project _____ Evaluator _____
S.R. No. _____ Date _____
V.R.M. Unit _____ Weather _____

Evaluation Scale: 1-7
1 = Very Low
4 = Medium
7 = Very High

Observer Viewpoint	VIEW ZONE		General Visual Quality (Level 2)	VISUAL QUALITY (Level 3) VIVIDNESS CRITERIA: Landform	Water	Vegetation	Manmade Dev.	Vividness (1-7)	FEATURES	INTACTNESS CRITERIA: Absence of Encroachment	Overall Intact.	Intactness (Av.;1-7)	ENCROACHMENT	UNITY CRITERIA: Man/natural	Overall Unity	Unity (Av.; 1-7)	Importance (1-3)	(V+I+U) ÷ 3	Vis. Quality (weighted av.)
	Inside R.O.W.																		
	O/S R.O.W.	I/S Unit																	
		O/S Unit																	
	Inside R.O.W.																		
	O/S R.O.W.	I/S Unit																	
		O/S Unit																	
	Inside R.O.W.																		
	O/S R.O.W.	I/S Unit																	
		O/S Unit																	

O/S R.O.W. = Outside R.O.W. I/S Unit = Inside Landscape Unit
O/S Unit = Outside Landscape Unit

SAMPLE VISUAL QUALITY EVALUATION, LEVEL 3

VISUAL QUALITY EVALUATION - VIEW OF THE ROAD

Project _____ Evaluator _____ Evaluation Scale: 1-7
S.R. No. _____ Date _____ 1 = Very Low
V.R.M. Unit _____ Weather _____ 4 = Medium
7 = Very High

VIEW				General Visual Quality (1-7)	VISUAL QUALITY (Level 3)														
	SETTING				VIVIDNESS						INTACTNESS				UNITY				
Observer Viewpoint	Land Use	Observer Position	Road Distance		CRITERIA				Vividness (1-7)	FEATURES	CRITERIA		Intactness (Av.;1-7)	ENCROACHMENT	CRITERIA		Unity (Av.; 1-7)	(V+I+U) ÷ 3	
					Landform	Water	Vegetation	Manmade Dev.			Absence of Encroachment	Overall Intact.			Man/Natural	Overall Unity			

LEGEND

Land Use
- URB = urban
- SUB = suburban
- IND = industrial
- COM = commercial
- INS = institutional
- RES = residential
- REC = recreational
- TRA = transportation

Observer Position
- S = superior
- N = normal
- I = inferior

Road Distance

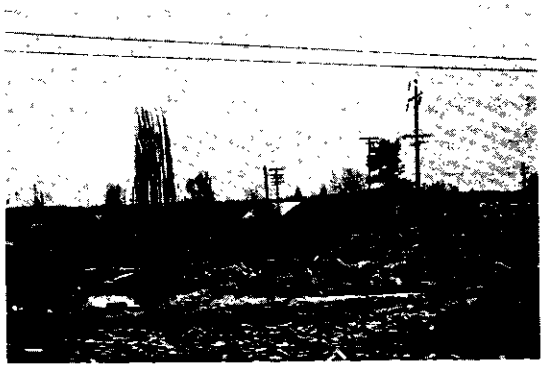
F	= foreground	to ½ miles (0.4 km)
M	= middleground	½ to 3 miles (0.4 km to 5 km)
B	= background	beyond 3 miles (5 km)

Evaluation Scale: 1-7 (1=Very Low, 4=Medium, 7=Very High)

VIVIDNESS	MANMADE DEVELOPMENT	ENCROACHMENTS UNDESIRABLE EYESORES	UNITY/INTACTNESS
Very high	None	None	Very high
High	Little	Few	High
Moderately high	Some	Some	Moderately high
Average	Average	Average	Average
Moderately low	Moderately high	Several	Moderately low
Low	High	Many	Low
Very low	Very high	Very many	Very many

VISUAL QUALITY

Let us compare a view of a pristine alpine tarn to that of an unsightly marsh landfill. We may note that while both scenes consist of land, vegetation, water and sky, one scene is strikingly vivid and the other mundane and nondescript; that while one is intact and bears little or no trace of distrubance, the other is severely encroached upon; and that while one exhibits overall visual harmony, balance, and compositional integrity, the other is merely chaotic, jumbled and confused and lacking in strong visual unity.



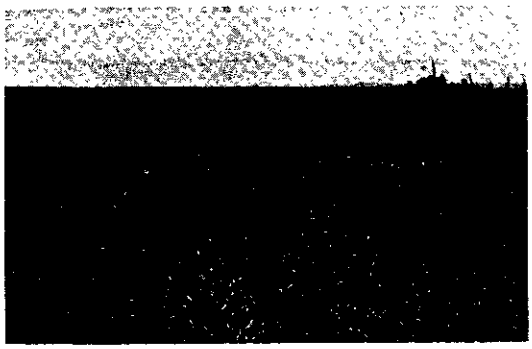
To perform an evaluative appraisal of landscape visual quality -- whether the landscape is a tarn or a landfill -- three criteria are particularly useful. These criteria are termed vividness, intactness, and unity. Expert evaluations based on these three criteria have proven to be good predictors of visual quality levels obtained from large numbers of public judgments, using the following simple equation:

$$\text{Visual Quality} = \frac{\text{Vividness} + \text{Intactness} + \text{Unity}}{3}$$

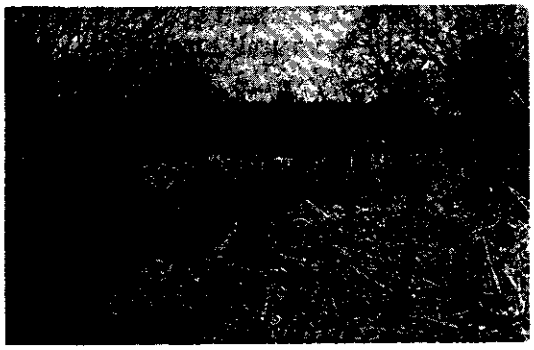
Each of the three criteria is independent; each is intended to evaluate one aspect of visual quality. In other words, no one criterion in itself captures visual quality. In the following pages we will examine the criteria of vividness, intactness and unity in more detail, with illustrations of each.

VIVIDNESS: LOW

The vividness or memorability of a landscape is derived from contrasting landscape components as they combine in striking and distinctive visual patterns. It is often useful to assess the vividness of individual landscape components. Landform vividness is frequently determined by the pattern elements of form or line. An example is the strongly defined skyline of the mountain landscape illustrated here.



Landcover is comprised of water, vegetation and manmade development. Water is often a vivid landscape component because of line (the shoreline or the dramatic edge of a waterfall) and color. Reflection, clarity and motion are particularly important aspects of water in relation to color and its contribution to the vividness of water in the landscape.

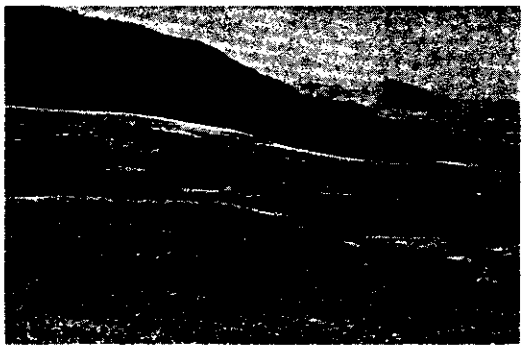


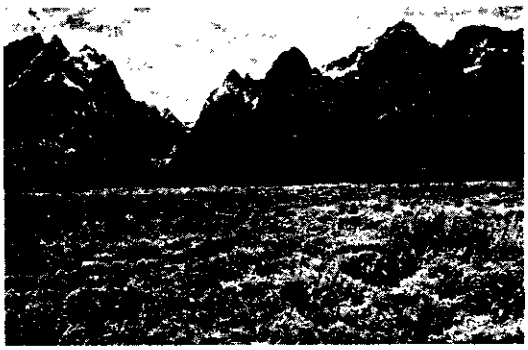
Vegetation is a major visual component in the landscape. It may frequently mask landform or water and can be manipulated for a variety of visual purposes. The degree of vividness in landscape vegetation is frequently due to the pattern elements of texture and color, Every year, autumn in New England provides many examples of landscapes which are highly vivid because of the colors and patterns of their vegetation.

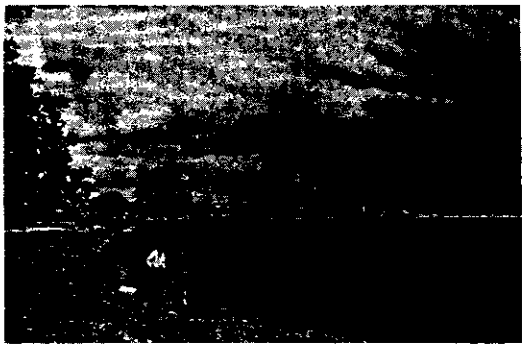
Manmade development often contrasts visually in form, line and color with its natural or manmade setting. Designers may deliberately utilize contrasting pattern elements to achieve a high degree of memorability for a particular building. Traditional land-use patterns and homespun construction may also result in vivid manmade development. On the other hand, too many contrasting visual elements may cancel each other and result in a scene of low memorability.

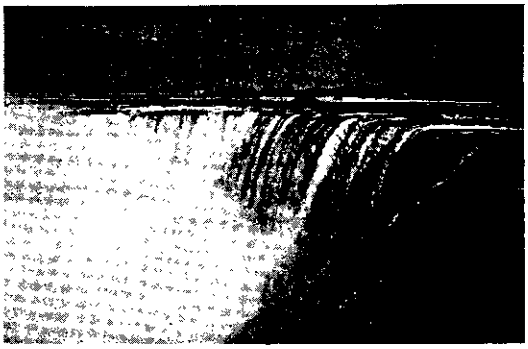
MODERATE

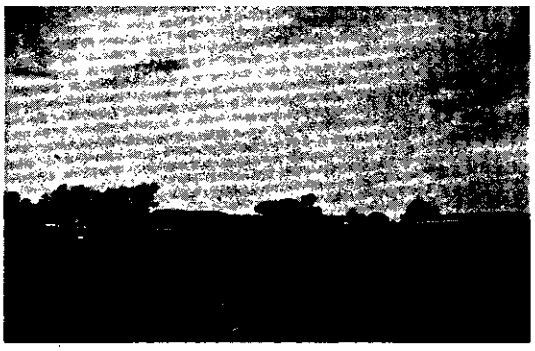
HIGH

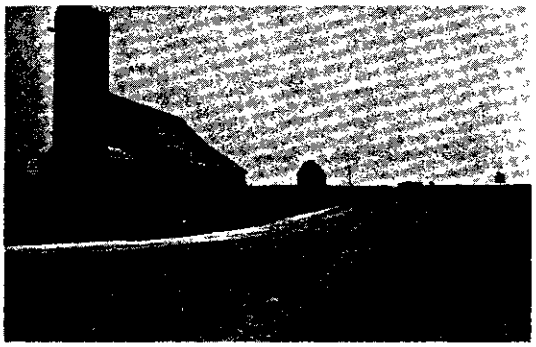


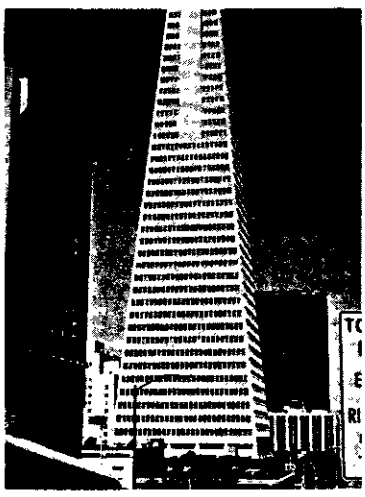










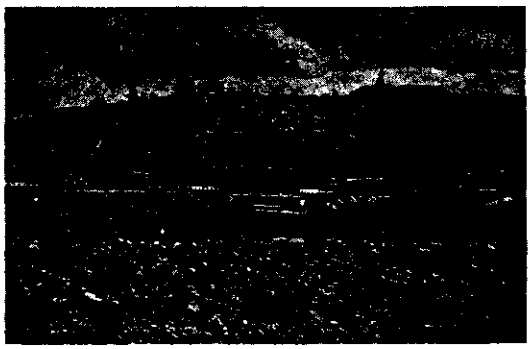


INTACTNESS: LOW

Visual intactness refers both to the integrity of visual pattern and the extent to which the landscape is free from visually encroaching features. In a predominantly natural environment, manmade development can be an additive element that does not necessarily encroach on its visual setting. However, the presence of visual encroachment or eyesores contributes to low visual intactness.

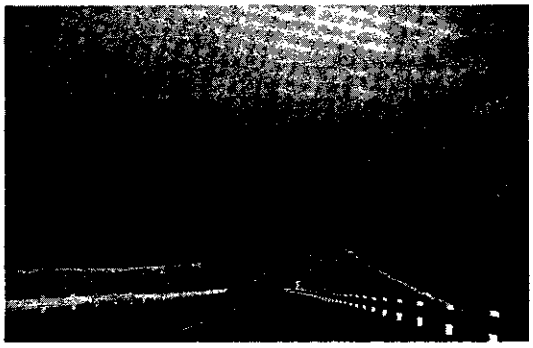
Predominantly manmade landscapes may have strong established visual character. Added manmade pattern elements may also encroach upon this type of landscape. The absence of eyesores or encroaching features thus contributes to high visual intactness in manmade environments.

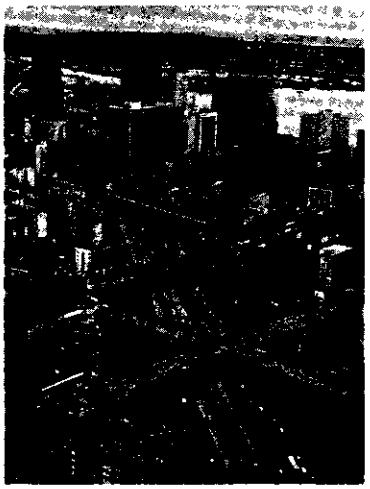
Visual intactness is also dependent on the integrity of visual order in the landscape. Overall intactness may be reduced by the obvious subtraction of visual elements. In a predominantly natural setting, an unreclaimed open-pit mine is an obvious example of low intactness. The natural visual order of an untouched landscape, such as these badlands, may be very intact, whatever its other visual qualities.



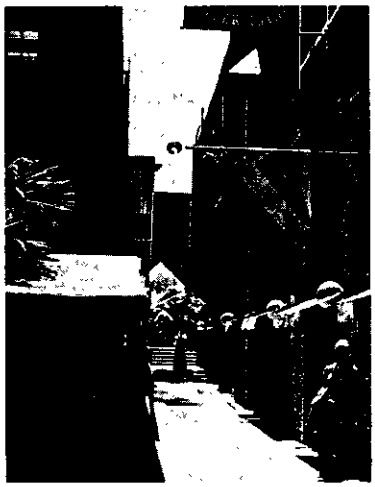
The visual integrity of manmade patterns and orders can also be disturbed. Subtractive disruptions of the urban pattern can reduce overall intactness in a particular cityscape to a low level. The urban pattern in the middle view has been partially re-established and visual intactness has been improved since the highway was first cut through.

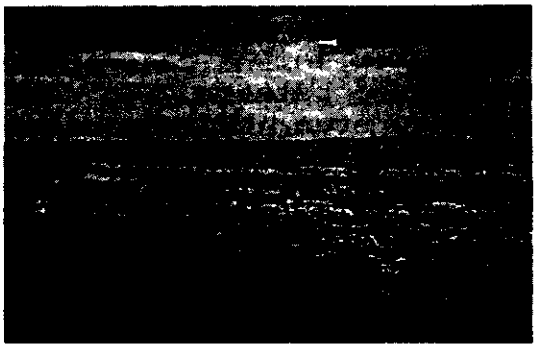
MODERATE





HIGH



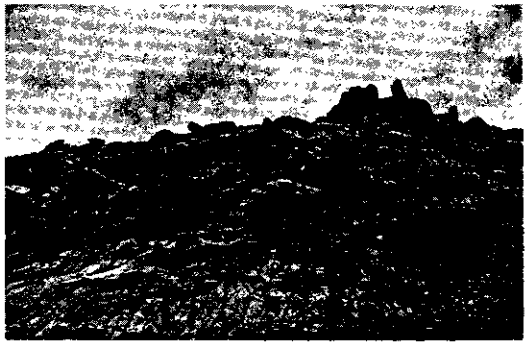


UNITY: LOW

Unity is the degree to which the visual resources of the landscape join together to form a coherent, harmonious visual pattern. One aspect of this criterion is the unity between manmade and natural pattern elements. In the predominantly natural landscapes shown here, the way in which the manmade elements have been introduced has a noticeably different effect on the visual unity of each scene.

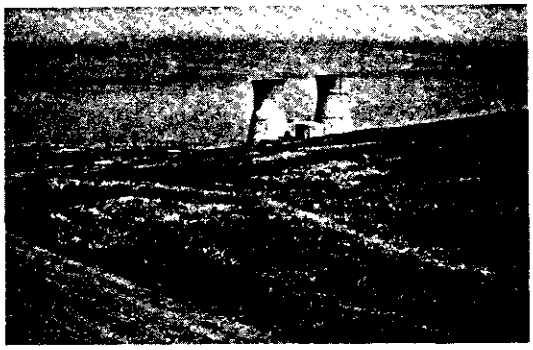
In a predominantly manmade setting, the inclusion of natural elements is a first condition of unity between manmade and natural elements. Manmade environments with no visual relation to natural landform or landcover patterns lack this element of unity. In other manmade environments, manmade and natural patterns may reinforce each other and result in high visual unity.

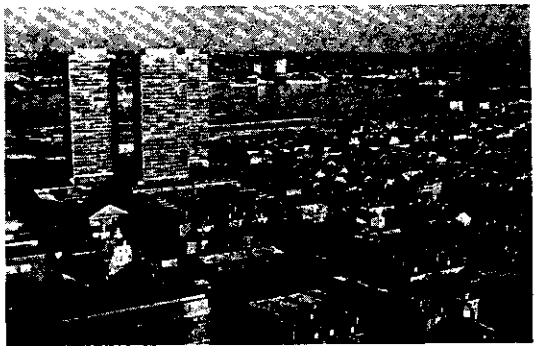
Overall unity is dependent on the degree to which all visual elements combine to form a coherent, harmonious visual pattern. In some instances, even entirely natural landscapes are visually chaotic and jumbled. They lack overall visual unity, to a greater or lesser degree, although they may be intact (the badlands scene) or vivid (the rock outcroppings). Characteristic, though ephemeral, light and atmospheric conditions may contribute to especially high overall unity.

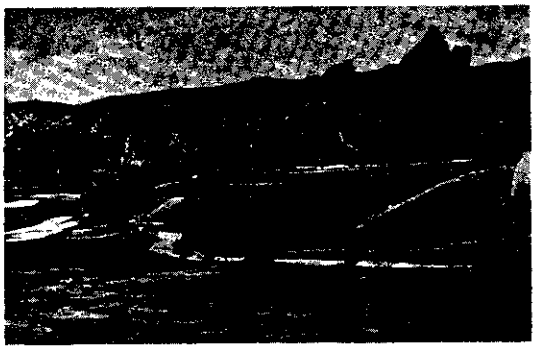


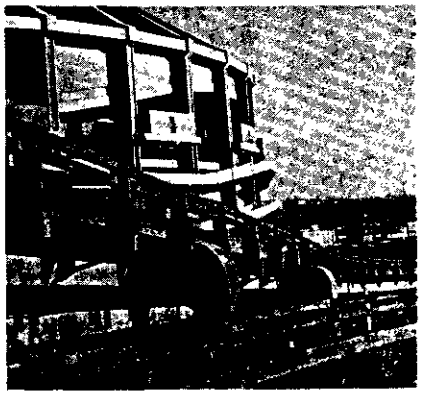
Predominantly manmade landscapes may also exhibit the full range of overall unity because of the compositional harmony of their visually interrelated components and patterns -- or the almost complete absence of this quality.

MODERATE

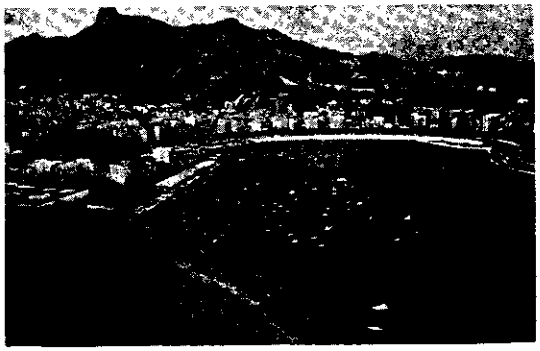


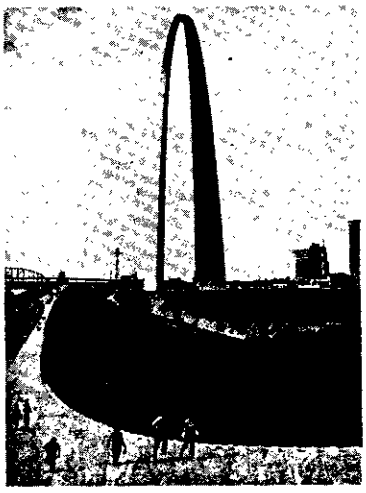






HIGH





EXERCISE: SUMMARY QUESTIONS

THE VISUAL ENVIRONMENT

1. Evaluation of visual quality between differing geographic areas of the United States (is) (is not) a valid comparative measure (i.e., the Rockies vis a vis New England).

2. A landscape unit can be thought of as:

   (a) everything that can be seen from a single point

   (b) an outdoor room

   (c) a single landscape type.

3. Identification (mapping) of a project's viewshed will usually (increase) (decrease) the percieved scope of its actual visual impact.

4. The visual resources within a project are quantifiable. True ____ False ___

5. The assessment of visual character is:

   (a) descriptive

   (b) evaluative.

6. The form of an object is its apparent surface coarseness. True ___ False ___

7. A highway will usually have a positive or unifying visual impact in a landscape which has a high level of:

   (a) pattern diversity

   (b) pattern continuity

8. The character of the visible landscape:

   (a) can be objectively described

   (b) is in the eye of the beholder

9. Visual quality can be objectively evaluated by:

   (a) Artists, Landscape Architects, Architects, and Visual experts

   (b) Citizens (d) Engineers

   (c) Public agencies (e) all of the above

10. Three evaluative criteria which can be used to evaluate visual quality are:

    (a) Form, color, texture

    (b) Vividness, intactness, unity

    (c) Pattern, continuity, character.

5 CHARACTERISTICS OF VIEWERS

Visual experience is a compound of visual resources and viewer response. To understand and predict viewer response to the appearance of a highway projects, we must know something about the viewers who may see the project and the aspects of the visual environment to which they are likely to respond. Vision is an active sense; we usually have some reason for looking at the landscape and what we see is unconsciously conditioned by what we are looking for. How we feel about what we see is conditioned by other human factors; many of these are shared among large groups of people and may be important for project planning.

Viewer Groups and Viewer Exposure

Visual perception is the basic act of seeing or recognizing an object. Naturally, we assume an unobstructed sightline, but other physical conditions can also affect perception. As observer distance increases, the ability to see the details of an object decreases. As observer speed increases, the sharpness of lateral vision declines and the observer tends to focus along the line of travel.

We can differentiate major *viewer groups* by physical factors that modify perception. For highway projects, we begin with the basic distinction of the view from the road (highway users) and the view of the road (highway neighbors). We can use viewshed mapping to further categorize these viewer groups by *viewer exposure:* the physical location of each viewer group, the number of people in each group, and the duration of their view.

Viewer Sensitivity

The receptivity of different viewer groups to the visual environment and its elements is not equal. This variable receptivity is *viewer sensitivity* and is strongly related to visual preference. It modifies visual experience directly by means of viewer activity and awareness; indirectly, sensitivity modifies experience by means of values, opinions, and preconceptions. High viewer sensitivity can be critical to project planning and design because it heightens viewer response and increases the importance of visual resource issues. In a few cases, high viewer sensitivity may tend to discourage any visible change to the project environment.

Activities such as commuting in heavy traffic or working on a construction site can distract an observer from many aspects of the visual environment. Head-mounted cameras, for instance, have demonstrated that a driver can look directly at a landmark and still not see it. On the other hand, activities such as driving for pleasure or relaxing in scenic surroundings can encourage an observer to look at the view more closely and at greater length. Therefore, *viewer activity* is another identifying characteristic of viewer groups.

This dramatic mountain gateway heightens the visual awareness of highway travelers.

For example, we may well want to distinguish among project viewers located in residential, recreational, and industrial areas.

Viewer awareness is the extent to which the receptivity of viewers is heightened by the immediate experience of visual resource characteristics. Visual change heightens awareness; a landscape transition, such as entering a mountain range or a major city, may heighten viewer awareness for a number of miles along a road. Measures that modify viewer exposure, such as selective clearing or screening, may also be deliberately employed to modify viewer awareness. For example, we well may want to distinguish among project viewers located in residential, recreational, and industrial areas.

Local values and goals operate indirectly on viewer experience by shaping view expectations, aspirations and appreciations. If the existing appearance of a project site is uninspiring, a community may still object to projects that fall short of its visual goals. At a regional or national level, viewers may be particularly sensitive to the visual resources and appearance of a particular landscape as a result of its *cultural significance*. This significance may be due to the presence of historic values, scientific or recreational resources, or other unique features; any visible evidence of change may be seen as a threat to these values or resources.

An elevated highway would traverse the unsightly industrial area on the other side of this waterway. Nevertheless, there has been strong public concern over the visual effects of the highway on future redevelopment and on the historic railroad station in the middle distance.

VIEWER GROUPS

Classes of viewers which differ in their visual response to the highway and its setting. Response is affected by viewer location, activity, and values.

GROUPS WITH A VIEW FROM THE ROAD

- *driver*
- *passenger*

GROUPS WITH A VIEW OF THE ROAD IN THE LANDSCAPE SETTING

- *residents*
  - *urban & suburban*
  - *rural*
- *commercial/industrial interests*
- *recreational groups*
  - *park, resort, overlook, & historic site visitors*
  - *river and lake users*
  - *scenic railroad passengers*
  - *trail users*
- *other special interest groups*
  - *civic*
  - *cultural*
  - *environmental*
  - *educational*
  - *economic*

GROUPS WITH A VIEW OF THE ROAD FROM THE ROADSIDE

- *wayside and rest area users*
- *cyclists and other traffic in right-of-way*

COMPARISON: Two Basic Groups

	HIGHWAY NEIGHBOR VIEW OF THE ROAD	HIGHWAY USER VIEW FROM THE ROAD
← Physical →	Maximum acuity	Reduced acuity
	Comprehensive field of vision	Narrowed cone of vision
	No constraint on vision	Point of concentration
← Psychological →	Desire for visual detail	Need for visual simplicity
	Viewer costs	Viewer benefits
	Visual problems	Visual opportunities

VIEWER EXPOSURE

The degree to which viewers are exposed to a view by their physical location, the numbers of people viewing and the duration of view

PHYSICAL LOCATION:

- distance zones
  - foreground
  - middle ground
  - background
- observer position
  - superior
  - normal
  - inferior
- direction of view
  - north
  - south
  - east
  - west

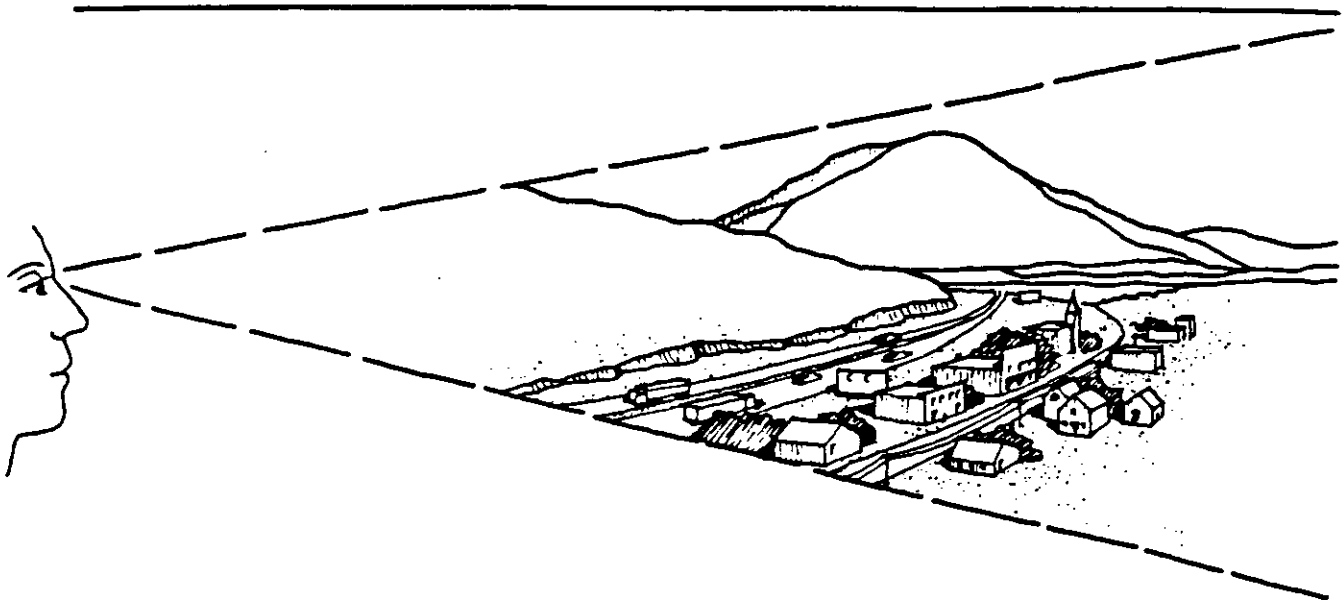
NUMBER OF VIEWERS:

- residents
- visitors
  - view <u>of</u> the road
  - view <u>from</u> the road

DURATION OF VIEW:

- frequency of exposure
- stationary view
- moving view

VIEWER SENSITIVITY



The preferences, values, and opinions of different viewer groups can be documented in the following ways:

- *viewer activity & awareness*
- *local values*
- *cultural significance of the visual resource*

ACTIVITY & AWARENESS

The degree to which viewers are likely to be receptive to the visual details, character, and quality of the surrounding landscape. Two principal factors affect viewer sensitivity: activity and awareness.

· Viewer Activity

A viewer's ability to perceive the landscape is affected by his activity. In a particular landscape setting, viewer activity may:

1) encourage him to look at the landscape, such as pleasure driving, or

2) distract him from the landscape, such as commuting in heavy traffic.

· Viewer Awareness

A viewer's receptivity to the visual character of the landscape can be affected by the landscape setting itself, or by expectations about the setting. Major variables are:

1) viewing position, such as an overlook or a position near a major landmark,

2) recent visual experience, such as a landscape transition, and

3) individual preconceptions about the landscape (and the highway's appropriateness in it).

CULTURAL SIGNIFICANCE

At a regional or national level, viewers may be particularly sensitive to the visual resources and appearance of a particular landscape because of:

· History

The landscape may commemorate some historic event.

· Scientific or Recreational Resources

The landscape may be singled out and widely known for values - scientific, recreational, esthetic - directly connected with its appearance.

· Uniqueness

Its visual resources, character or quality may be uncommon or rare in the region or nation.

LOCAL VALUES

The visual appearance of certain landscapes and certain visual resources within these landscapes may be important to the local community because of:

- *Local Visual Preferences*
- *Local Historical Associations*
- *Local Aspirations and Goals*

The highway agency's community involvement program can help to identify visual resources affected by local values and goals.

VIEWER RESPONSE

VIEWER EXPOSURE

- viewshed
- viewing groups and numbers
- viewer location, distance and position
- view duration and frequency

VIEWER SENSITIVITY: ACTIVITY AND AWARENESS

- current viewers
- new viewers

VIEWER SENSITIVITY: LOCAL VALUES

- current local values and plans
- project impacts on these values

VIEWER SENSITIVITY: CULTURAL SIGNIFICANCE

- existing historic, scientific, unique or recreation resources
- elimination or change of the resource and its setting

EXERCISE: SUMMARY QUESTIONS

CHARACTERISTICS OF VIEWERS

1. The visual experience which one receives from his or her surroundings depends heavily on what is seen and ones reaction to it. This can be characterized as:

   (a) Visual exposure and viewer awareness

   (b) Visual activity and viewer consciousness

   (c) Visual resources and viewer response.

2. An observer's ability to see the details of an object decreases when the distance from the object (increases) or (decreases).

3. A driver traveling at a high speed will have the same lateral vision as one traveling at a lower speed. True ___; False ___.

4. Visual awareness is generally heightened by:

   (a) Viewer exposure

   (b) Viewer activity

   (c) Visual Change.

5. The most important viewers to be addressed in a visual assessment are those with:

   (a) A view of the road

   (b) A view from the road

   (c) A view of the road from the roadside

   (d) All of the above.

6 VISUAL EFFECTS OF HIGHWAY PROJECTS

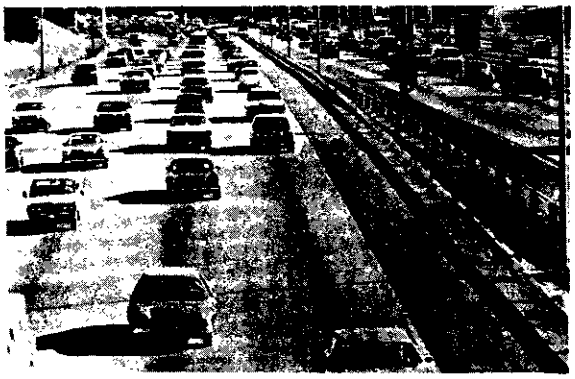
This chapter is designed to show how the principles that we discussed in the preceding chapters apply to the visual effects of highway projects. We will identify the visual characteristics of typical highway projects, look at some examples of their effects, and consider viewer response to these effects. Finally, we will discuss ways to assess the visual effects of projects at different stages in the highway development process.

VISUAL CHARACTERISTICS OF HIGHWAYS

Adverse visual impacts are not consciously designed into a project; they creep in when decisions are made without considering the visual consequences. This is particularly true of highway projects, which are very complex, take a long time to complete, and are planned by large, diverse teams of specialists. The visual effects of project decisions such as right-of-way limits and lighting are readily overlooked until it is too late. For these reasons, it is important that the project team systematically consider the visual appearance of the total highway early and throughout project development.

Roadway, Roadside and Right-of-way

The most immediately obvious visual component of a highway project is the road surface itself. The exact cross-section, plan, and profile proposed for a specific road are far more important to its visual effects than the generalized characteristics of its functional class. Roadway variables with clear visual implications include the number of travel lanes, their width, and pavement material and color. Shoulders can also be visually important; for example, paved shoulders enlarge the roadway's apparent scale and turf shoulders minimize it. Design speed and gradient standards help determine the roadway's visual effects on its visual environment. The relationship of opposing travel lanes is also visually significant; an undivided four-lane highway looks very different from a divided highway with independent alignment for each travel direction. Another visually important factor is the coordination of horizontal and vertical curves. Many of these roadway variables are hard to adjust because of capacity and safety requirements, and other limitations. Nevertheless, they can be significant in determining the visual effects of the highway.



The number of lanes and total width of the roadway go far to determine the visual effects of a highway.

Horizontal and vertical curves have been coordinated on this freeway, making it appear to flow smoothly over the rolling landscape, despite the high design speed.

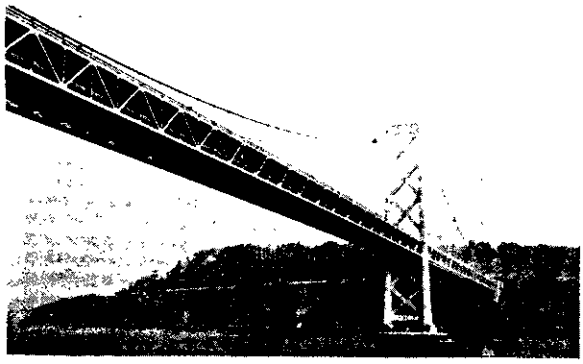
The roadside includes all lands within the right-of-way that are not part of the roadway. The visual characteristics of the roadside are determined by the landcover and landform modifications employed to fit the roadway into the right-of-way: clearing, earthwork, slope retention, drainage, and roadside planting. The appearance of the roadside helps to determine the visual scale and dominance of the highway. A wider right-of-way may actually allow us to reduce the visual scale of the highway by reducing apparent roadside width. For example, it may allow flatter side slopes which blend back into the surrounding landscape and are not perceived as roadside. It may also allow a natural-appearing median between independently aligned roadways, substituting the appearance of two smaller highways for one large highway.

Structures and Appurtenances

We may imagine a new highway as a ribbon of pavement flowing smoothly through its landscape. In reality, the view of this ribbon is often obscured by a profusion of highway structures and "highway furniture." The need for highway structures may be foreseen at the EIS stage and their visual effects can be identified if we remember to consider their visual characteristics, even though final grade and other details may not be known. The location and appearance of highway appurtenances can be more difficult to determine. Many of these have been developed as safety and environmental improvements; unfortunately, incremental change has sometimes been a principal cause of visual deterioration along existing highways. In situations where visual impact is likely to be an issue we need to think about appurtenances at the EIS stage, just as we do structures, recognizing that their final positions will not be assigned until later.

Structures for the roadway itself may include bridges, viaducts, tunnels, and their portals. Grade separation structures may include interchanges, overpasses, and underpasses for roads, railroads, and transit. Slope retention structures and drainage structures may include retaining walls, bin walls or gabions. While these may not be firmed up by the time of the EIS, except when forced by the 4(f) or historic preservation procedures, any of these structure types may be dominant because of size or viewer position. A new structure may also replace an existing structure which is an important visual resource or is valued for its historic significance. For these reasons, the visual characteristics of highway structures can be a major consideration in a project EIS.

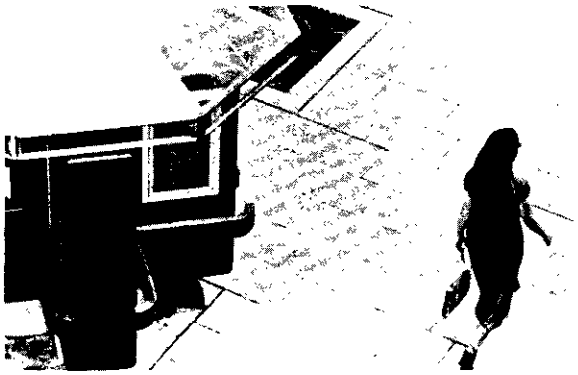
The visual appearance of minor highway structures, such as this series of retaining walls, can also contribute to the quality of the visual environment.



Careful consideration has been given to the visual appearance of major highway bridges; some have become regional landmarks and scenic elements.

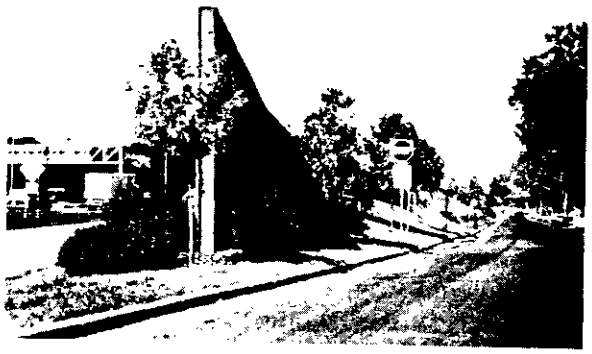
The visual unity of the highway can be enhanced by the design of highway appurtenances.

Lights, signs, and traffic control devices are among the highway appurtenances that can have significant visual effects. When lights are required, the height, spacing and configuration of the standards or supports are very important; we may also need to know the light distribution pattern of the fixture type, its glare cutoff characteristics, and the color of the light it produces. The visual characteristics of highway signs include placement, size, color (both front and back), lighting, reflectorization, and support structure. The last can be particularly important for examples such as the sign bridges on freeways. Traffic control devices include conventional traffic signals and new "readerboard" devices for metering congested freeways. Size, lighting, glare cutoff, and support structure can be very important; the size and location of signal control equipment can also be a significant consideration for urban streetscapes.



Traffic signal equipment is often bulky and unsightly. On urban streetscape projects, it can be consolidated in attractive kiosks with multiple functions.

Acoustic barriers or "noise walls" are increasingly prominent highway appurtenances. They have been installed along major highways to reduce community noise levels, but several communities have also objected to the installation of acoustic barriers because of fears over loss of views or other perceived visual impacts. Some of these objections can probably be traced to specific designs, since a wide selection of barrier types is available. The alternatives include earth berms and wood, concrete, or metal barrier construction, either singly or in combination. The visual characteristics of these alternatives should be carefully considered in acoustic barrier planning and design. Their general type and configuration can be envisioned, although noise walls are not normally designed by the time of the EIS, unless they are to protect 4(f) lands.



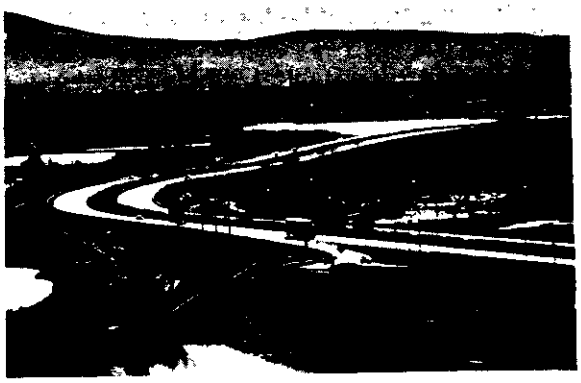
The visual appearance of noise barrier designs can complement the visual character of neighborhoods next to highways.

Highway appurtenances also include the various safety devices installed along the roadside edge. Concrete median barriers ("Jersey" barriers) guard rails, and impact attenuators are among these devices. These appurtenances can adversely affect the appearance of the highway if added incrementally, but they can also have positive visual effects if integrated into highway planning and design. The need for these devices should be identified in the visual assessment when possible, although design details will generally be unavailable. This is true of many of the preceding types of appurtenances, because their design is generally not finalized until later phases of the highway development process.

Impact attenuators and other safety improvements can affect the appearance of existing highways to which they are added.

Highway-related Facilities

Highway construction, operation, and maintenance requires a number of facilities which may be located either within or outside the right-of-way; their visual effects may also be significant. Highway-related construction facilities may have important short-term and long-term effects; they include construction staging areas, borrow pits, and spoil disposal areas. The location of these is frequently the contractor's option and may not be determined until the contract is let; however, consideration at the EIS stage could be advisable for very sensitive projects. Highway operation may also require a variety of facilities, including rest areas, scenic overlooks, service areas, inspection stations, and patrol stations. Joint-use facilities may be visually significant, including transit stops, park-and-ride lots, and bus parking, as well as recreational, office, and preservation uses. Schematics and feasibility studies for these are often available at the EIS stage. Finally, highway maintenance facilities may cause localized visual problems, particularly where equipment and material storage are involved. Secondary effects—developments which are likely to follow after the project is completed—should also be considered.



Highway borrow pits are often a visual problem, but they can also represent a visual opportunity.

Joint uses such as car-pool parking can enhance the visual appearance of otherwise wasted space beneath elevated highways.

Measuring Impact

KEY CONCEPTS

Visual Impact:

The degree of change in visual resources and viewer response to those resources caused by highway development and operations.

Visual Resource Change:

The degree of change in visual resources caused by highway development and operations, assessed without regard to viewer response.

Viewer Response:

Measures of viewer response to visual resource change include viewer exposure, sensitivity and cultural significance and local values.

Visual Impact = Visual Resource Change + Viewer Response

VISUAL RESOURCE EFFECTS

When highway projects alter the physical environment, they also alter the visual information in that environment, its visual character, and its visual quality. Several typical project examples will help to illustrate the nature and variety of these visual resource effects.

Visual Information

Highway projects substitute new visual information for old. The roadway always displaces existing visual resources, but the roadside sometimes retains these resources (particularly vegetation) or replaces them with other resources that are similar. The identity and extent of the landscape components involved can be important in themselves because of visual preferences; viewers may feel that forestlands are visually more important then farmlands—or vice versa. A simple tabulation of the landscape components affected by each project alternative provides a framework for considering these visual preferences.

Viewers also tend to notice and value the unusual. For example, a stand of large trees along an existing road can be sufficiently striking and unusual that a community may object to a widening project that would remove them. Highway projects may have to detour around such features; therefore it is often useful to identify any landscape components that are scarce or sensitive in the project area or the surrounding region.

Removing these live oaks would degrade the visual quality of this historic Florida town.

Visual Character

Concern over the appearance of a highway project often is based on how it will affect the overall visual character of an area rather than on the particular visual resources it will displace. Federal law identifies certain settings where effects on character are the paramount visual resource concern. Among these are wilderness areas, rivers in the National Wild and Scenic Rivers System, parks, recreational areas, wildlife and waterfowl refuges, and historic districts, sites, buildings, and structures.

Specific criteria have been adopted for evaluating the impact of development on historic properties. The introduction of visual elements "that are out of character with the property or alter its setting" is considered an adverse effect; such elements would jeopardize viewer perceptions of the reality of the past and its relevance to the present. It is important to note that the visual character of the project is at issue, not the project itself; if the character of the project can be made to complement the character of the historic property and its setting, it may have no adverse visual effects.

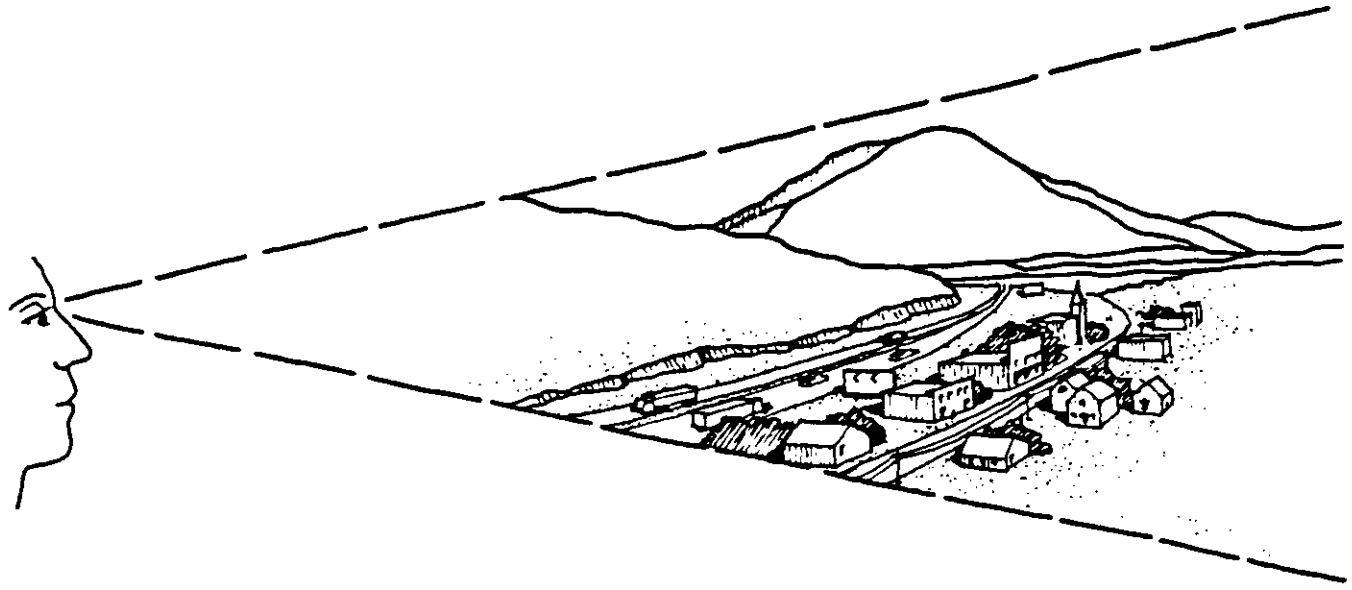
In chapter Four we discussed several attributes of visual character that are relevant to highway projects; these include pattern elements (form, line, color, and texture) and pattern character (dominance, scale, diversity, and continuity). Both the project and the project setting can be assessed according to these attributes; if their visual character is similar, the visual *compatibility* of the project will be high. If the visual character of the project contrasts strongly with the visual character of its setting, its visual compatibility will be low.

An explicit analysis of visual character frequently makes it possible to modify a

A steel guard rail was carefully designed to complement the visual character of this historic bridge after the appearance of a concrete barrier proved unsatisfactory.

project to improve its visual compatibility. For example, objections to the appearance of safety improvements for a historic bridge were resolved, through the required historic preservation coordination procedures, by substituting an unobtrusive steel guard rail for a visually dominant concrete barrier that would have contrasted strongly with the existing bridge in form, color and texture. The steel guard rail is small in scale and is not visually dominant. Some contrast in color and texture was considered desirable so that viewers would not misread the rail as part of the historic structure.

VISUAL COMPATIBILITY



The actual or potential compatibility of a project with its landscape setting can be objectively evaluated by examining the:

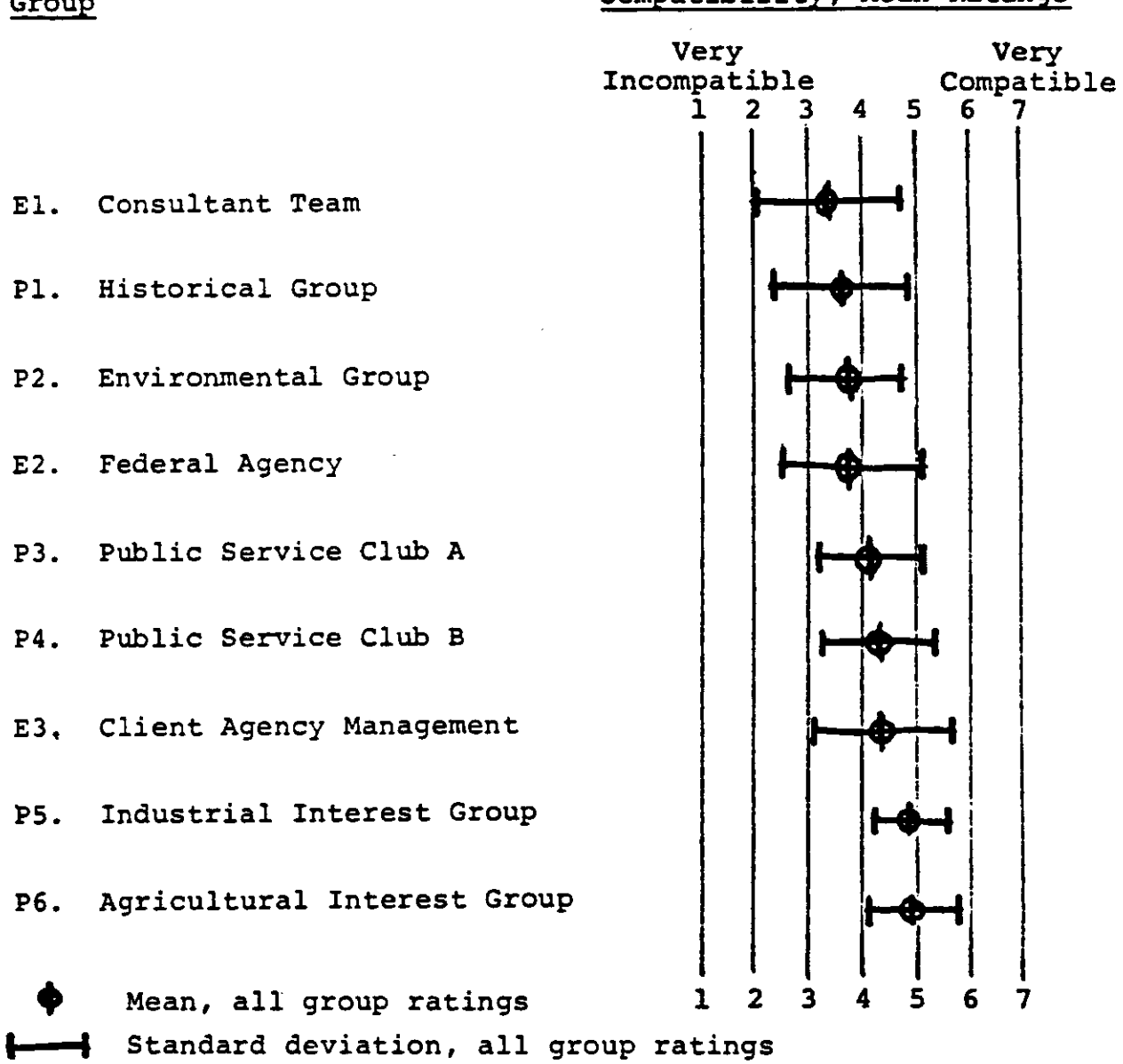
COMPATIBILITY OF **PATTERN ELEMENTS**

(form, line, color, texture)

COMPATIBILITY OF **PATTERN CHARACTER**

(dominance, scale, diversity, continuity)

COMPARISON OF GROUP VALUES AND ABILITY TO MAKE VISUAL DISTINCTIONS



What This Diagram Illustrates:

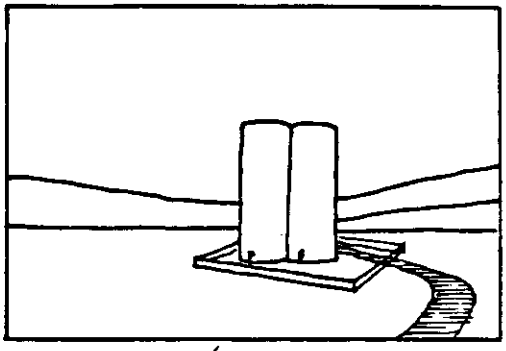
1. There are significant differences in group values about visual resources, related to overall group interests.

2. Expert groups make more discriminating judgments about visual compatibility than the general public.

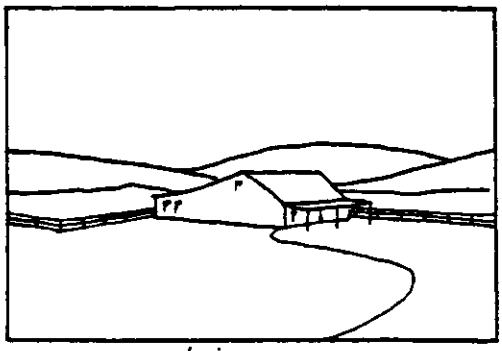
3. Agency expert groups appear to know how to fit a feature into its visual surroundings, although they may have to be convinced of the need to make the effort.

COMPATIBILITY: PATTERN ELEMENTS

Form

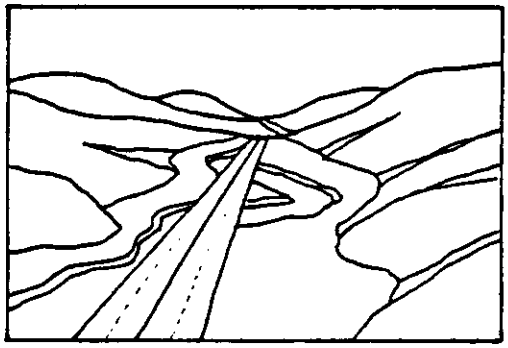


low

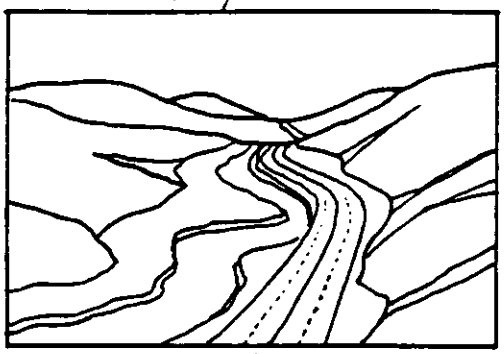


high

Line

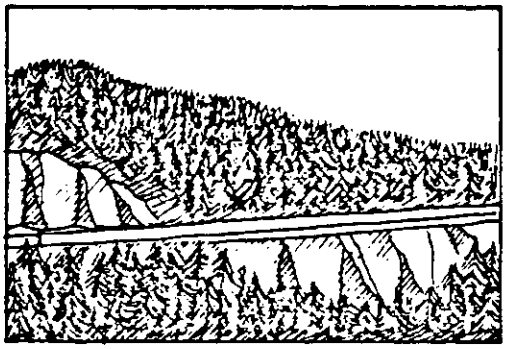


low

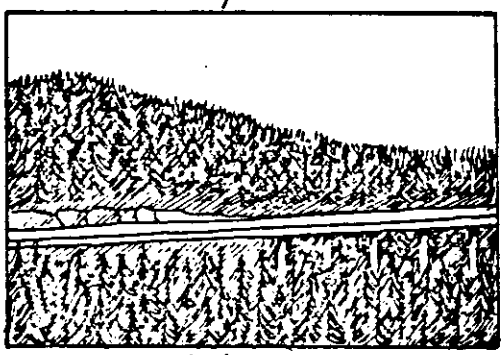


high

Color

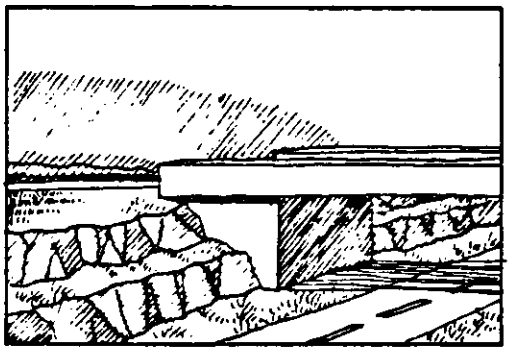


low

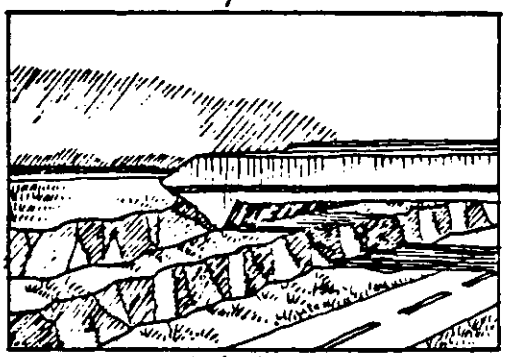


high

Texture



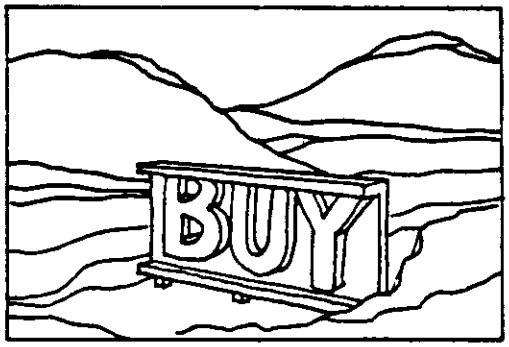
low



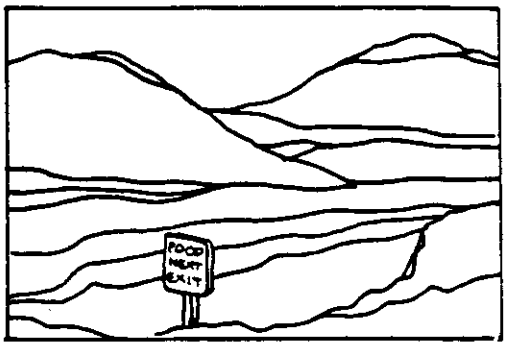
high

...and PATTERN CHARACTER

Dominance

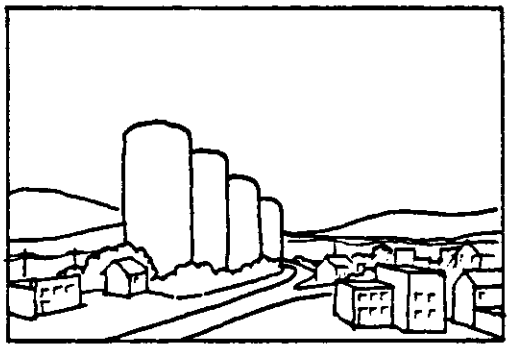


low

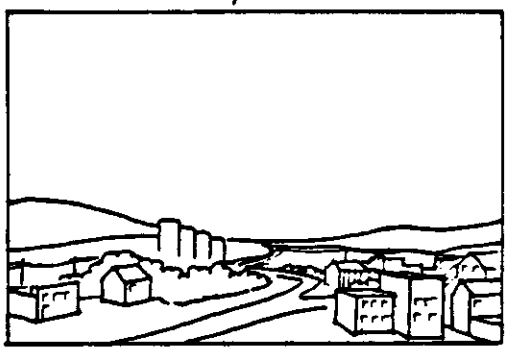


high

Scale

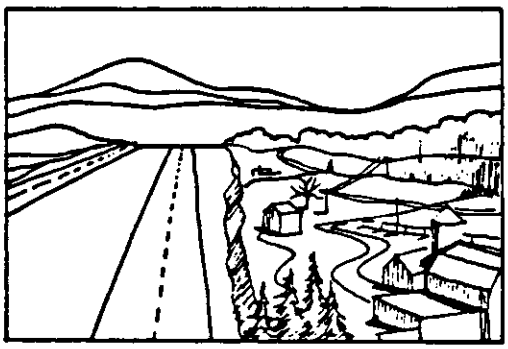


low



high

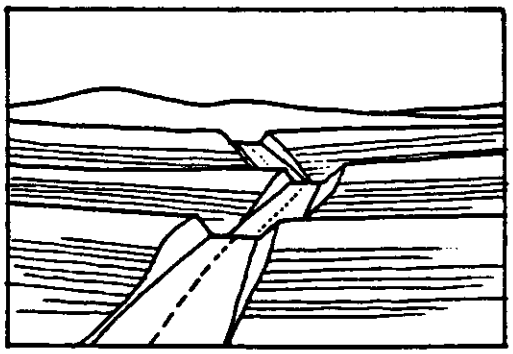
Diversity



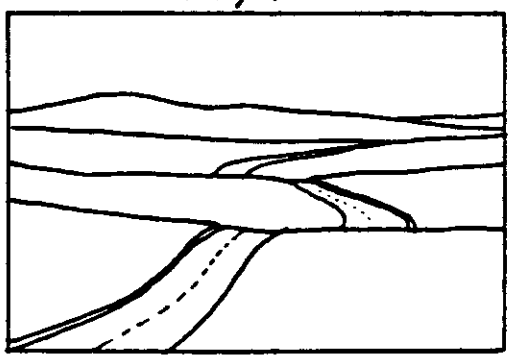
low

high

Continuity



low



high

VISUAL QUALITY

One important indicator of the public concern a project is likely to generate is the visual quality of its landscape setting. Highway projects in landscapes with high visual quality are likely to receive close scrutiny. In certain classes of lands, areas with high visual quality are singled out for special consideration in highway project planning. These classes include "4(f) lands" (public parks, recreation areas, wildlife and waterfowl refuges, and historic sites) and lands associated with the National Wild and Scenic Rivers System. On other lands managed for their resource values, special management attention is paid to all types of development in areas with high visual quality; these lands include those managed by the U.S. Forest Service and the Bureau of Land Management. Where visual quality is high, we may have to carefully consider the visual effects of relatively simple projects, such as straightening a rural trunk highway and widening its shoulders.

When this trunk road to a wilderness canoe area is upgraded, its alignment will be adjusted to preserve several large "sentinel pines".

Low visual quality does not necessarily mean there will be no concern over the visual effects of a project, however. In instances such as urban entry roads, communities may ask that highway projects help improve existing visual quality. The DOT Design, Art, and Architecture in Transportation program supports such requests by emphasizing the consideration of the design arts in projects with high public visibility or use. In other words, improvements to the visual quality of everyday environments deserve consideration just because these environments are experienced so frequently by so many people. Streets and highways are major public investments and attention to their design quality can do much to raise visual quality around them.

Highway projects may affect the visual quality of an area by displacing attractive visual resources—or adding them. The "esthetic additive" approach was taken in the Highway Beautification program but proved vulnerable to budget cuts and maintenance reductions. Moreover we have seen that visual quality is often due to the visual relationships among all components of a landscape, rather then the presence of a single preferred feature. As we discussed in Chapter Four, explicit evaluative criteria may be used to appraise these relationships.

This major urban streetscape project widened travel lanes and sidewalks by removing curbside parking. A principal visual objective was also to unify the diverse commercial architecture along the street by the use of consistent color, texture, and scale in paving and "street furniture".

Vividness, intactness, and unity are three criteria that have proven to be effective indicators of visual quality. Visually successful projects usually achieve a balance among all three; too frequently, design emphasis is placed on one of these criteria at the expense of the other two.

For example, a pedestrian mall can be "oversized" and made so vivid that it is out of character with the surrounding urban environment and detracts from visual unity. This example is not meant to indicate that vivid contrast always causes an adverse effect on visual quality. The bridges of the Swiss engineer Maillart exhibit vivid form and color, but also maintain the visual intactness of their mountain settings and achieve strong visual unity with those settings. In many urban settings, however, the number and variety of existing manmade forms suggest that enhancing overall visual unity may be a more effective approach to improving visual quality than attempting to introduce vivid new forms into the setting. For example, an urban arterial improvement and streetscape project may deliberately understate individual design elements such as street lights, traffic signals, and paving patterns.

VISUAL IMPACT

VISUAL IMPACT = VISUAL RESOURCE CHANGE + VIEWER RESPONSE

VISUAL RESOURCE CHANGE

CHANGE IN VISUAL INFORMATION
- *existing visual resources*
  introduced resources

COMPATIBILITY OF VISUAL CHARACTER
- *existing character*
  compatibility of new feature

RESULTING VISUAL QUALITY
- *direct measurement of alteration*
  (appraise built product)
  - *existing visual quality*
  - *visual quality after development*
- *prediction of alteration*
  (appraise simulated project)
  - *existing visual quality*
  - *visual quality after development*

PREDICTING CHANGE IN QUALITY

PREDICTING CHANGE IN VISUAL QUALITY
(AT DIFFERENT STAGES IN THE DEVELOPMENT PROCESS)

- **PLANNING** (*Project is not site specific*)

CHANGE = VISUAL QUALITY (*before development*) + VISUAL COMPATIBILITY

- **LOCATION AND DESIGN** (*Project is site specific*)

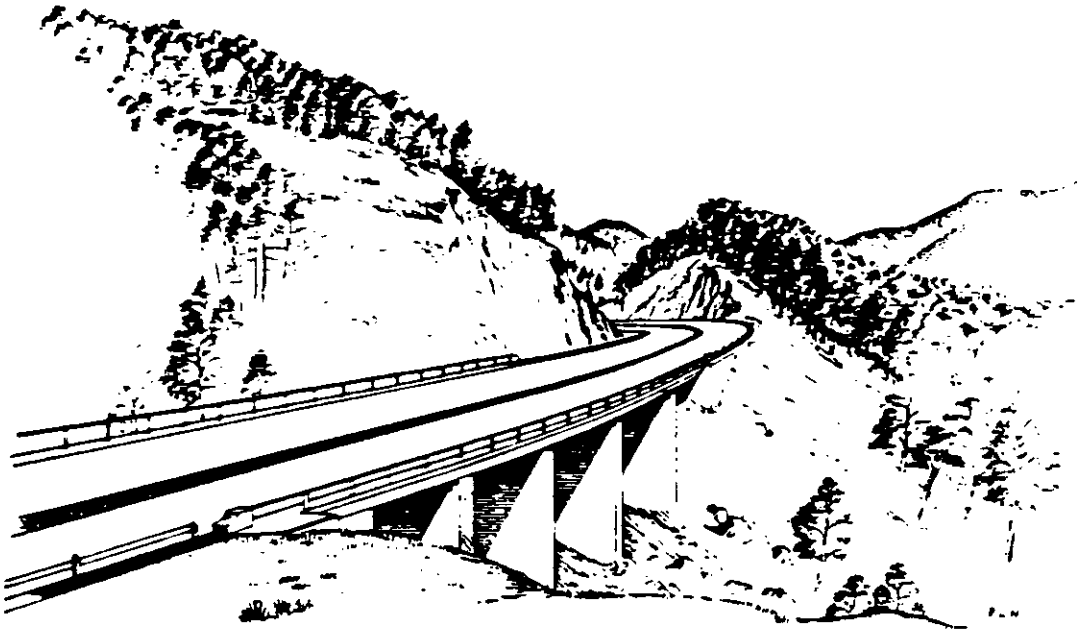
CHANGE = VISUAL QUALITY (*before development*) + VISUAL QUALITY (*after development*)

- **CONSTRUCTION AND MAINTENANCE**
(*Site has already been modified*)

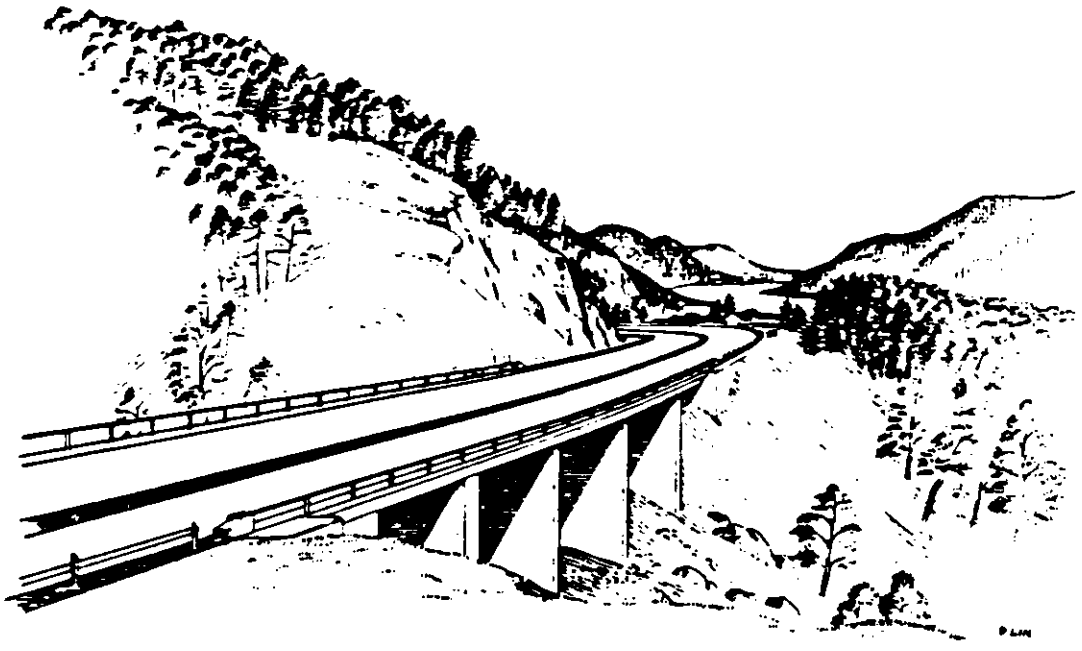
CHANGE = VISUAL QUALITY (*after development*) + VISUAL COMPATIBILITY

SIMULATION

SIMULATING VISUAL RESOURCE CHANGE: ARTISTS' SKETCHES OF PROPOSED ACTIONS

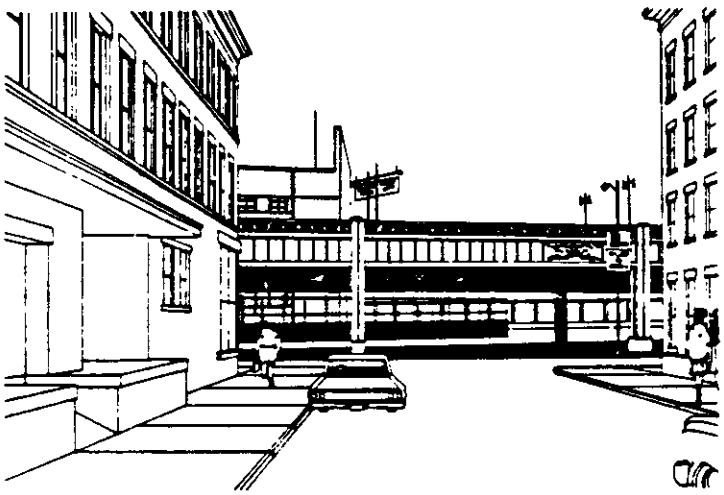


Removing a residual piece of rock between the freeway and a natural slope can lead to smoother landscape design and can open up vistas which are otherwise obscured

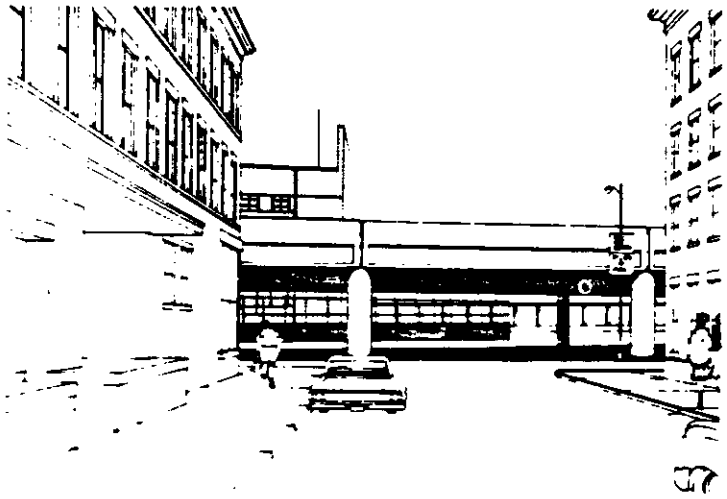


Source: C. Tunnard and B. Pushkarev, Manmade America: Chaos or Control? (New Haven, Conn.: Yale University Press, 1963), p. 226.

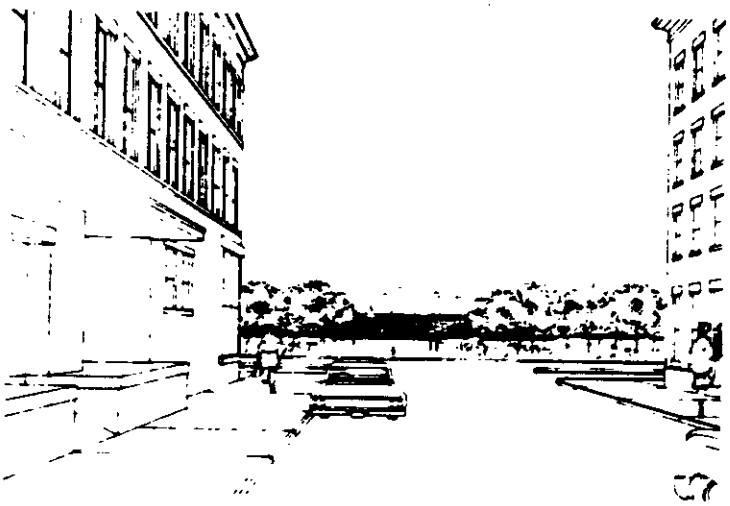
SIMULATING VISUAL RESOURCE CHANGE: ARCHITECTURAL RENDERINGS OF THE WEST SIDE HIGHWAY, NEW YORK



MAINTENANCE



INBOARD RECONSTRUCTION



OUTBOARD

Source: U.S. Department of Transportation, New York Department of Transportation, West Side Highway Project Environmental Impact Statement (New York: 1974), p. 187.

VISUAL IMPACT EVALUATION

LEVEL OF QUALITY

V.Q. BEFORE & V.Q. AFTER

- Vividness
- Intactness
- Unity
- V.Q. = $\frac{V+I+U}{3}$

NUMERIC DIFFERENCE

change = (V.Q. before) - (V.Q. after)

VISUAL QUALITY EVALUATION - VIEW OF THE ROAD

Project Name _____ **Evaluator** _____

Assessment Unit _____ **Date** _____

Weather _____

Evaluation Scale: 1-7
1 = Very Low
4 = Medium
7 = Very High

Observer Viewpoint	VIEW: Proposed \ Existing	VIEW: SETTING * Land Use	VIEW: SETTING * Observer Position	VIEW: SETTING * Road Distance	General Visual Quality	VISUAL QUALITY: Overall Vividness	VIVIDNESS: Memorability of landscape components as they combine in striking and distinctive visual patterns — FEATURES	General Intactness	INTACTNESS: The integrity of visual pattern. The extent to which the landscape is free from visual encroachments. — ENCROACHMENT	Overall Unity	UNITY: The degree to which visual elements of the landscape join to form a coherent, harmonious visual pattern. — ELEMENTS	(V+I+U) ÷ 3	IMPACT: Visual Quality Difference	IMPACT: Positive Impact	IMPACT: Negative Impact
	E														
	P	X													
	E														
	P	X													
	E														
	P	X													
	E														
	P	X													
	E														
	P	X													
	E														
	P	X													

VISUAL QUALITY EVALUATION - VIEW FROM THE ROAD

Project Name _____ **Evaluator** _____

Assessment Unit _____ **Date** _____

Weather _____

Evaluation Scale: 1-7
1 = Very Low
4 = Medium
7 = Very High

VIEW		General Visual Quality	VISUAL QUALITY							IMPACT		
			VIVIDNESS		INTACTNESS		UNITY					
Observer Viewpoint	Proposed / Existing		Overall Vividness	Memorability of landscape components as they combine in striking and distinctive visual patterns. FEATURES	General Intactness	The integrity of visual pattern. The extent to which the landscape is free from visual encroachments. ENCROACHMENT	Overall Unity	The degree to which visual elements of the landscape join to form a coherent, harmonious visual pattern. ELEMENTS	(V+I+U) ÷ 3	Visual Quality Difference	Positive Impact	Negative Impact
	E											
	P											
	E											
	P											
	E											
	P											
	E											
	P											
	E											
	P											
	E											
	P											

LEGEND

Land Use
- URB = urban
- SUB = suburban
- IND = industrial
- COM = commercial
- INS = institutional
- RES = residential
- REC = recreational
- TRA = transportation

Observer Position
- S = superior
- N = normal
- I = inferior

Road Distance

F	= foreground	to ¼ miles (0.4 km)
M	= middleground	¼ to 3 miles (0.4 km to 5 km)
B	= background	beyond 3 miles (5 km)

Evaluation Scale: 1-7 (1=Very Low, 4=Medium, 7=Very High)

VIVIDNESS	MANMADE DEVELOPMENT	ENCROACHMENTS UNDESIRABLE EYESORES	UNITY/INTACTNESS
Very high	None	None	Very high
High	Little	Few	High
Moderately high	Some	Some	Moderately high
Average	Average	Average	Average
Moderately low	Moderately high	Several	Moderately low
Low	High	Many	Low
Very low	Very high	Very many	Very many

VIEWER RESPONSE TO HIGHWAY PROJECTS

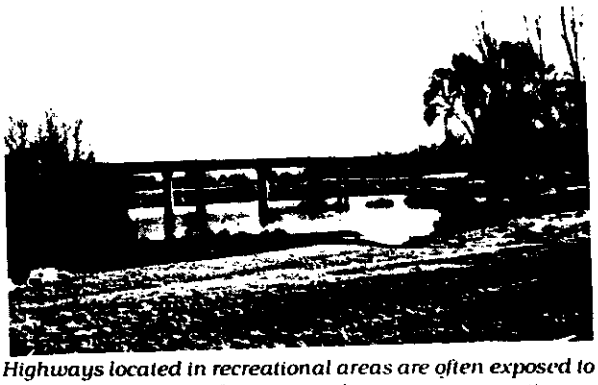
Several factors discussed in Chapter Two can help us gauge viewer response to a project's visual effects. These factors include viewer exposure and three aspects of viewer sensitivity: activity and awareness, local values, and cultural significance.

Viewer Exposure

First, will the project be viewed by persons other than its users? If so, what are the viewer groups, how many people are in them and how far away are they? The answers help to establish viewer exposure to the project. Viewer exposure may be particularly high along urban rights-of-way and in public use areas; the latter may include safety rest areas, auto-restricted zones, transit malls, fringe parking and certain joint development projects. High viewer exposure heightens the importance of early consideration of design, art, and architecture and their roles in managing the visual resource effects of a project. As an alternative or supplement to managing those effects, we can manage viewer exposure by adjustments to project location and alignment, and by mitigation measures such as full or partial screening. Viewer exposure may become an important issue where the sight of the highway—however well designed—would intrude on the visual character of historic districts or natural areas. In extreme cases, projects have been depressed or placed in tunnels to restrict or eliminate views of the highway.

Viewer Sensitivity: Activity and Awareness

Viewer activity and awareness can be significant variables in the selection of highway alternatives. For example, one location may expose a highway to viewers in a recreation area, a second to viewers in an industrial zone. Alignment and design alternatives, such as "daylighting" a curve, may expose highway users to a view that heightens their awareness of an approaching destination. Conversely, bypass highways have sometimes eliminated views of bypassed communities and have diminished driver awareness of town centers.



Highways located in recreational areas are often exposed to a very sensitive group of viewers with strong preconceptions about the visual appropriateness of roads in these settings.

Sometimes a highway project can make a significant contribution to the renewal of a city center by increasing the traveler's awareness of the center and improving the visual quality of the entry to it.

Viewer Sensitivity: Local Values

Local values and goals may confer visual significance on landscape components and areas that would otherwise appear unexceptional in a visual resource analysis. Highway planners can learn about these special resources and community aspirations for visual quality through project citizen participation procedures, as well as from local publications and planning documents. Community organizations such as arts councils and historic societies should also be consulted. The resulting information

will sometimes surprise the out-of-town expert. For instance, planners investigating location alternatives in a small western city found what appeared to be a promising alternative in a small river valley with open land, private ownership and industrial zoning. Its existing visual resources include an old dam and powerplant, exposed penstock, gravel roads, and several transmission lines. However, contact with community groups revealed that the valley

Hydropower development seriously encroaches on the visual quality of this river valley, but local residents regard it as a scenic area and oppose further development of any type.

is regarded locally as a wildlife refuge, an historic area, the scenic core of the city's open space system—and strictly off-limits for new transportation development.

Viewer Sensitivity: Cultural Significance

Regional or national cultural significance is usually accompanied by formal designation (or by study status for designation) that recognizes a property or district for its historic, wilderness, recreational, or other value. While such properties or districts are not necessarily high in visual quality, we have seen that their visual character is often considered important to their cultural value. The planning and design of a highway project in an historic district or the rehabilitation of an historic bridge may have to make concessions to the visual character of the district or bridge. Alternatively, project visibility may be controlled with vegetation, an appropriately-designed acoustic barrier, or other means to avoid perceived visual incompatibility with a setting savored for its absence of visible evidences of contemporary urban civilization.

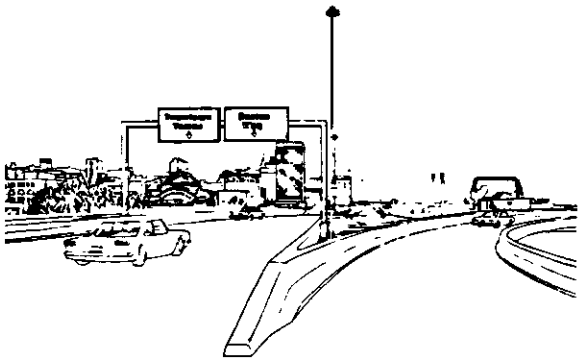
VISUAL EFFECTS AND PROJECT STAGES

The highway development process can be divided into five general stages: planning, location, design, construction and maintenance. The visual effects of a highway project are most clearly defined in the last project stages, but they are determined progressively throughout the process. The most broad-reaching effects are determined early. If the highway corridor contains resources that are highly valued for their visual character, highway alignment and design may be unable to completely avoid or

Despite considerable design effort, this bridge approach structure does not succeed in eliminating adverse visual effects on the church next to it.

mitigate adverse visual impacts that are "locked in" by corridor selection. Conversely construction and maintenance are crucial to the realization of design intentions. Consideration of visual effects and the highway development process can ensure that problems and opportunities are identified soon enough for effective action.

Drawings or simulations of project appearance from representative viewpoints provide a direct means of evaluating the visual effects of highway alternatives. At the design stage, we can illustrate the appearance of the alignment, alternative structures, roadside appurtenances, and roadside planting in detail. Unfortunately, most environmental assessments are prepared earlier, during the location stage. If approximate alignment and typical cross-section are known, these can provide sufficient information to illustrate the general appearance of the highway. If controversy over the visual effects of the project still exists, final environmental



A lighting and signing alternative is illustrated in this sketch of a view from the road; this visually simple alternative was preferred, partially because of the complex geometry of the roadway itself.

clearance may be delayed until the studies necessary to provide visual details can be carried out. This has occurred on a number of urban freeway projects and also on highways through scenic areas.

The probable broad-scale visual effects of a project can be considered early in the highway development process, even if project information is insufficient to simulate and assess specific project views. First, the visibility and viewer exposure of alternative corridors can be assessed by mapping the viewsheds of major existing viewer groups. Significant and valued visual resources can then be located and avoided. The landscape units can be identified and their visual quality assessed. Finally, the visual compatibility between the proposed project type and the landscape types representative of the project area can be established by comparing their visual character. By generalizing the principle that high contrast is likely to adversely affect high visual quality, conflict areas can be identified. Highway planners can then avoid placing corridors in these areas or can identify these conflicts for resolution during design.

EXERCISE: SUMMARY QUESTIONS

VISUAL EFFECTS OF HIGHWAY PROJECTS

1. The cross-section, plan and profile of a highway _____ (will or will not) be important to the visual effects of the highway project.

2. Since lights, signs, and traffic control devices are common highway safety appurtenances, it is not necessary that they be considered in determining the visual effect of a highway. True ___; False___.

3. If the visual character of a highway contrasts strongly with the visual character of its setting, its visual compatibility will be:

   (a) High

   (b) Low.

4. Projects located in landscape settings that have low visual quality will never have a visual impact. True___; False ___.

5. Highway projects can enhance existing visual quality. True ___; False ___.

6. Vividness, intactness, and unity are three criteria that are effective indicators of visual quality. In order to be visually successful, a project must:

   (a) Have any combination of all three

   (b) Achieve a high balance of all three

   (c) Be strong in any one of the three.

7. Visual significance of landscape components ____ (can or cannot) be determined by visual inventories or inspections alone.

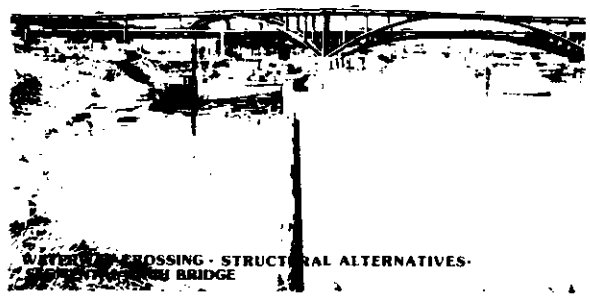
8. In assessing the visual impact of a project, concern should be given to the visual effects of the project during night hours.
   True ___; False ___.

7 VISUAL IMPACT MITIGATION

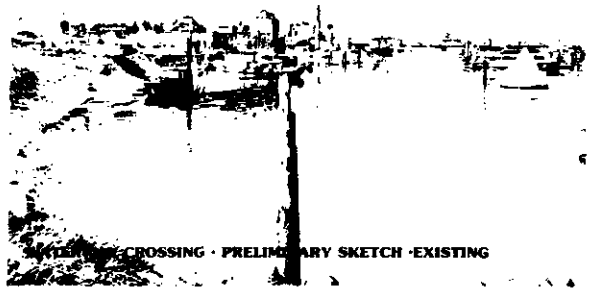
Mitigation encompasses the enhancement of positive effects as well as the reduction or elimination of negative effects. To be relevant, visual mitigation measures must address the specific visual impacts or problems caused by project alternatives. Different types of mitigation measures are appropriate to successive stages in the highway development process. In the location stage, highway corridors can avoid traversing visual resources that are exceptional in quality or visually incompatible with highway development, while maintaining the potential for views to these resources. On the viewer response side, viewsheds of sensitive viewer groups or historic sites can be bypassed.

During design, alignment can be manipulated to minimize blockage of existing views, to enhance good views from the road, and avoid bad ones. Care can be taken to maximize the visual compatibility of the project with adjoining parks or historic districts. Finally, special effort may be put into the design of structures and public use areas, including the incorporation of art and architecture, to ensure that these project components have high visual quality in themselves as well as in relation to the larger project environment.

To ensure the full realization of any mitigation actions, highway agencies must coordinate environmental assessment activities with the subsequent design, construction, and maintenance phases of highway development.



In response to community concerns about the future visual appearance of this area, the highway agency studied structural alternatives for this crossing. This segmental arch design would span the waterway cleanly and enhance its visual unity. This alternative would avoid adverse effects on existing visual quality, but would not markedly improve that quality.



Despite the presence of water and boats, the existing quality of this view is relatively low because of the encroachment of fill, dereliction, and a general lack of visual unity. Redevelopment for recreational boating has begun, however, and community expectations for visual improvement are high.

Development of a public boat launch and park under the crossing could help to bring the visual potential of the waterway to reality. The inclusion of joint use in this project would provide significant beneficial impacts on visual quality and land use.

MITIGATION PLANNING

1 Identify priority viewpoints

2 Rate and rank each viewpoint

3 Develop and prioritize objectives for critical viewpoints

4 Evaluate mitigation options to meet objectives

5 Finalize mitigation plan

MITIGATION OBJECTIVES

How to write a Visual Resource Management Objective:

environmental management principle	+ assessment of effect +	critical viewpoint	+ viewer groups
• protect • enhance • conserve • mitigate	• visual compatibility • visual quality	• view of project • view from project	• driver passenger • residents users occupants

EXAMPLES:

- Enhance + the visual quality + of the view of the project + for residents on Tumwater Hill.
- Mitigate + the diversity of pattern character + for the view from the project + for the driver.

MITIGATION OPTIONS

Corridor selection

Horizontal alignment

Vertical alignment

Slope ratios

Grading

Right of way width

Walls

Fences

Curbing

Pavement marking

Selective clearing

Landscaping

Signing

Lighting

Guard rail

Bridges

Service structures

Mowing patterns

Litter pickup

Roadside delineators

Noise barriers

8 MANAGEMENT BY VISUAL OBJECTIVES

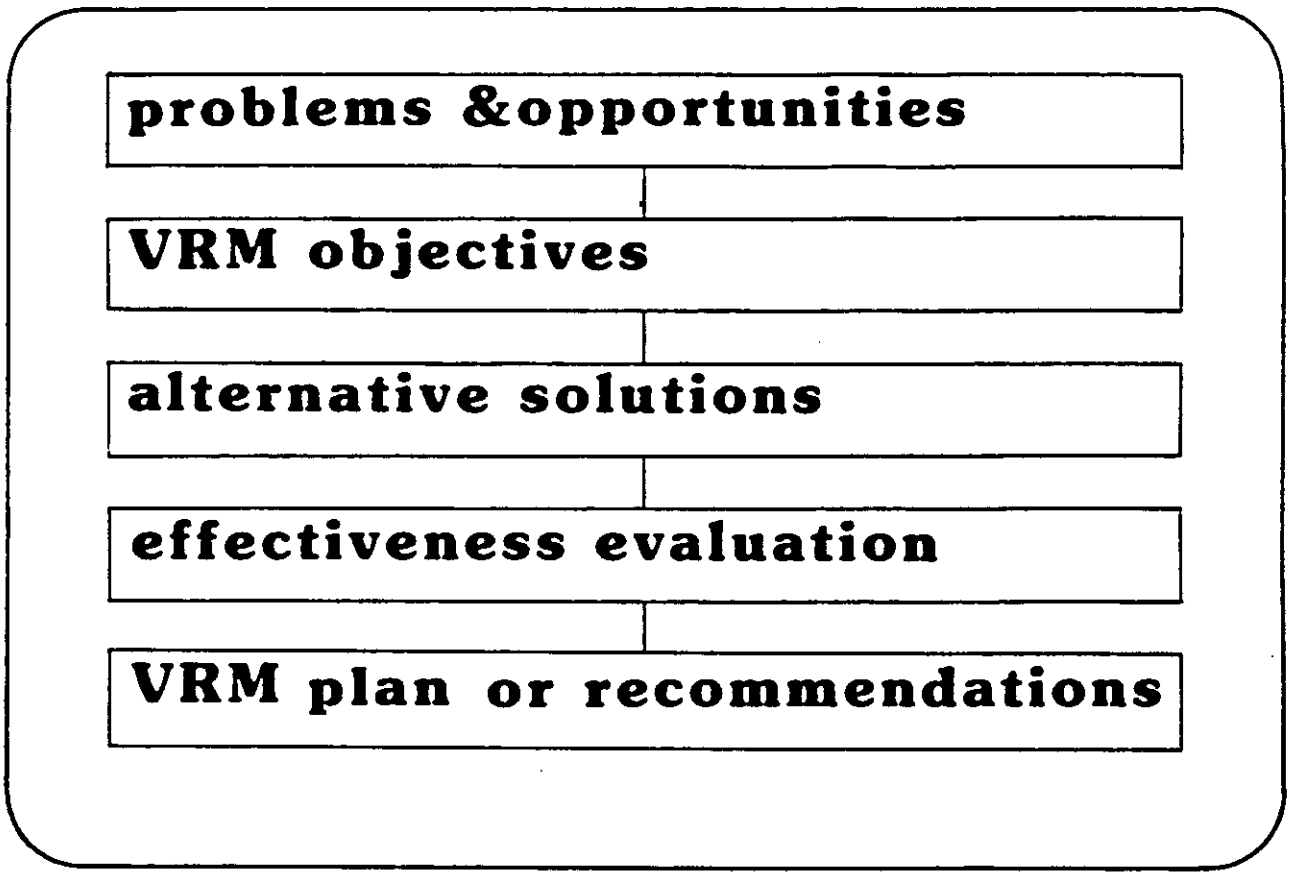
Visual assessment processes can be directly linked to management processes by the visual resource management (VRM) objective.

A VRM objective must specify the visual resources and viewer groups to be affected, the results to be achieved, the time for achievement, and the means for measuring achievement.

Establishing VRM objectives allows the planner or designer to compare the visual effectiveness of alternatives.

VRM objectives also make it easier to integrate visual considerations with other considerations in decision-making.

VISUAL MANAGEMENT PROCESS



MANAGEMENT PRINCIPLES

These principles are commonly applied to the management of a broad range of environmental resources, including visual resources.

PROTECTION

- *to guard resources from change,*
- *maintain existing resource quality,*
- *prevent adverse impacts.*

ENHANCEMENT

- *to augment resources,*
- *improve resource quality above some standard,*
- *heighten positive impacts.*

CONSERVATION

- *to utilize resources with moderate change,*
- *hold resource quality at some standard,*
- *minimize adverse impacts.*

MITIGATION

- *to alleviate effects of resource utilization,*
- *upgrade resource quality to some standard, offset adverse impacts.*

MANAGEMENT ACTIONS

Manipulate the landscape components, landform and landcover (water, vegetation, manmade development),

to control the visibility of areas (viewsheds/ vistas),

- extent and duration of view
- number of viewers
- Location of viewers

to change visual elements and relationships, and

- visual information in the landscape
- visual character of the landscape
- visual quality of the landscape
- visual compatibility of the road in the landscape

to influence viewer groups,

- types of viewers
- viewer sensitivity

WRITING V.R.M. OBJECTIVES

How to write a Visual Resource Management Objective:

V.R.M. NEED + PROBLEM/OPPORTUNITY

environmental management principle + *assessment of effect* + *visual resources* + *viewer groups*

EXAMPLE:

Enhance + the visual quality + of the view of the project + for residents on Tumwater Hill

PLANNING FOR V.R.M. : AN OUTLINE

I. Design the Work Process

   A. Organize the Visual Inventory, Analysis and Evaluation Techniques
      1. Level of effort appropriate to each stage
      2. Specialist staff required for each stage

   B. Agree on a Format for VRM Recommendations and Plan

II. Perform Visual Assessment

   A. Identify Assessment Units
      1. Landform and landcover
      2. Landscape units
         a. Area-wide (location alternatives)
         b. Highway alignment (fixed location)
      3. Major viewer groups
      4. Viewsheds
         a. Area-wide (location alternatives)
         b. From and of highway (fixed location)
      5. Visual resource assessment units

   B. Analyze and Evaluate Visual Resources
      1. Inventory visual information in highway R.O.W. and setting
      2. Analyze visual character of highway and setting
      3. Evaluate existing visual quality of the landscape, including the highway and its setting
      4. Evaluate visual compatibility of the highway with its setting (or visual quality <u>after</u> development)
      5. Document effects of highway on visual resources

   C. Analyze and Evaluate Viewer Response
      1. Additional viewsheds, as needed: from and of highway
      2. Analyze viewer exposure to highway and setting
      3. Evaluate viewer sensitivity to visual resources
      4. Evaluate cultural significance of specific resources
      5. Document viewer response to change in visual resources.

III. Establish Visual Resource Management Objectives

   A. Establish VRM Needs
      1. Landscape Context
         a. Area-wide
         b. Within specific units
      2. Viewing Context
         a. View from the road
         b. View of the road

3. Phases of Highway Development Process
    a. Planning and location
    b. Design and redevelopment
    c. Construction and maintenance
4. Identify visual problems and opportunities
    a. Critical areas
    b. Existing positive effects (impacts)
    c. Existing negative effects (impacts)
    d. Identify potential visual effects (impacts) of new development
5. Determine applicable management principles
    a. Preservation
    b. Enhancement
    c. Conservation
    d. Mitigation

B. Formulate VRM Objectives
1. VRM Need
    a. Management principle
2. Visual problem or opportunity
    a. Assessment of effect
    b. Visual resources
    c. Viewer groups

IV. Develop VRM Recommendations or Plans

A. Propose Alternative VRM Actions
1. VRM Objective
    a. Viewers
    b. Visual resources
    c. Visual problem or opportunity
        i. Effect
        ii. Cause
    d. Management principle
2. Possible visual resource management actions
    a. Landform
    b. Water
    c. Vegetation
    d. Built form
3. Potential Effects
    a. Visual resource
        i. Information
        ii. Character
        iii. Quality
        iv. Compatibility
    b. Viewer Response
        i. Exposure
        ii. Sensitivity
        iii. Cultural significance

4. Select appropriate actions
    a. Planning and location
        i. Corridor
        ii. Route
    b. Design and redevelopment
        i. Alignment
        ii. Cross-sections
        iii. Structures
        iv. Landscaping
    c. Construction and maintenance
        i. Techniques for visual quality control during construction
        ii. Maintenance

B. Decision-Making
1. Evaluate Alternative VRM Actions
    a. Priorities among alternative VRM actions
        i. Relative cost and effectiveness
        ii. Concentration of resources
        iii. Political process
        iv. Other considerations
    b. Integrate with other highway concerns
        i. Operations
        ii. Economy
        iii. Safety
        iv. Other environmental concerns
2. Agree Decision Between All Members of Highway Development Team
    a. Resolve conflicts between objectives

C. Prepare Visual Resource Management Recommendations or Plans
1. Highway Development Process
    a. Planning and location - general alternatives
    b. Design and redevelopment
    c. Construction and maintenance - specific actions
2. Recommended VRM actions
    a. Effect of actions
    b. Cost of actions
    c. Prioritize actions
3. Set level of effort and schedule appropriate to each phase
4. Select specialist staff required
5. Implications for next phase of Highway Development Process
    a. Appropriate and relevant VRM considerations
    b. Continuity
    c. Prior consultation

SUMMARY

Wide-ranging Federal laws and regulations require explicit consideration of visual resource issues in management programs and individual projects.

In addition, many states have parallel laws and requirements. With the demonstrated success of major agency systems, demand is growing for the use of VRM techniques by other agencies.

An increasing emphasis on movement from assessment into active management, for projects as well as lands, is also recurring.

Visual resource management offers a battery of techniques to assure appropriate consideration of esthetics at all project stages for an expanding range of project types.

GLOSSARY

Color:
The third of the four basic elements of visual pattern; the hue (e.g. red or blue) and value (e.g. light or dark) of the light reflected or emitted by an object.

Commemoration:
Landscapes and special districts formally or informally recognized for their connection with past events. The visual quality, character, or information of these settings may have acquired cultural value beyond that revealed in an assessment based strictly on visual resources.

Continuity:
Continuity is the uninterrupted flow of pattern elements, maintenance of visual relationships between immediately connected or related landscape components or features.

Cultural Significance:
Specific landscape settings may be significant because of cultural values; the setting must be at least briefly examined in its regional and national contexts to determine if it is culturally significant. Three general criteria are: uniqueness, commemoration, and designation.

Designation:
Landscapes and special districts formally or informally recognized for their historic, educational, scientific, recreational, or esthetic value. Designation may affect viewer expectations about these areas.

Direction of Light:
Indicates how light strikes the surface of objects in terms of back, front, or side-lighting.

Backlighting: A viewing situation in which sunlight is coming toward the observer from behind a feature or elements in a scene.

Frontlighting: A viewing situation in which sunlight is coming behind the observer to a feature or elements in a scene.

Sidelighting: A viewing situation in which sunlight is coming from the side of the observer to a feature or elements in a scene.

Distance Zones:

Three conventional terms in painting--foreground, middleground, background--which can be helpful in describing distance relationships.

Foreground (0 to ¼-½ mile): That area which can be designated with clarity and simplicity not possible in middle and background because the observer is a direct participant. He can have the impressions of immediate details--bark pattern, boulder forms, or degraded parts. This is a zone of important linkage because it sets a tone of quality or its absence. Intensity of color and its value will be at a maximum level, lacking the effect of color diminution due to atmospheric scattering of light rays. At greater distances, the intensification of aerial perspective becomes an important means of discrimination.

Middleground (¼-½ to 3-5 miles): A critical area for two reasons. This is where the parts of the landscape can be seen to join together, where hills become a range or trees make a forest. This is also where manmade changes may be revealed as sitting comfortably upon the landscape. Or where conflicts of form, color, shape, or scale show up. Colors will be unmistakable but they will be more blue, softer than those of the foreground. Some of the sharpness of value contrasts will be reduced.

Background (3-5 to infinite miles): That area where distance effects are primarily explained by aerial perspective. Surfaces of land forms will lose detail distinctions, emphasis will be on outline or edge, with background becoming an effective foil against which foreground or background is more clearly seen--a figure-ground relationship. Silhouettes and ridges of one land mass against another are the conspicuous visual parts of the background with skyline the strongest line of all (Litton).

Districts:

The medium-to-large sections of the city, conceived of as having two-dimensional extent, which the observer mentally enters "inside of", and which are recognizable as having some common, identifying character. Always identifiable from the inside, they are also used for exterior reference if visible from the outside. (Lynch)

Diversity.
The number of pattern elements as well as the variety among them, and edge relationships between them.

Dominance:
Dominance of components or specific features in a scene may be dominant because of prominent positioning, contrast, extent, or importance of pattern elements.

Edges:
The linear elements not used or considered as paths by the observer. They are the boundaries between two phases, linear breaks in continuity: shores, railroad cuts, edges of development, walls. They are lateral references rather than coordinate axes. Such edges may be barriers, more or less penetrable, which close one region off from another; or they may be seams, lines along which two regions are related and joined together. These edge elements, although probably not as dominant as paths, are for many people important organizing features. (Lynch)

Ephemeral Influences:
Those diverse and transitory effects that defy cataloging. Some of them are positively related to light but represent somewhat more unusual phenomena; they could be described as "double-take" effects. As factors they are divided into four groupings: 1) meteorological conditions, 2) seasonal expectations, 3) projected and reflected images, and 4) animal occupancy and signs. (Litton)

Esthetics:
The science or philosophy concerned with the quality or sensory experience (in this course, limited to visual experience). A branch of philosophy dealing with the nature of the beautiful and with judgments concerning beauty. It is also viewed as a body of knowledge about those characteristics of objects that make them pleasing or displeasing to the senses, and those characteristics of human perception that affect sensation. The quality of being esthetic is not the opposite of the qualities of "practicality" or "reality," but rather another aspect or way of experiencing the same real world phenomena. Thus, blue skies, uncontaminated water and uncluttered urban landscapes all have aesthetic value, because they imply health, pleasure and security. (Murtha)

Form:
One of the four basic elements of visual pattern (usually the strongest); the mass or shape of an object.

Human Response to Landscape:

Descriptive Assessments: A human response to the landscape which simply seeks to depict, rate, measure, etc., the attributes of specific visual resources or landscapes.

Evaluative Appraisals: A judgment of the relative quality of specific visual resources or landscapes against some implicit or explicit standard of comparison.

Preferential Judgments: An expression of a wholly personal subjective appreciation of (or repugnance for) specific visual resources or landscapes. (Craik)

Imageability:
That quality in a physical object which gives it a high probability of evoking a strong image in any given observer. It is that shape, color, or arrangement which provides a strongly identified, powerfully structural, highly useful mental image of the environment.

Intactness:
The integrity of visual order in the natural and man-built landscape, and the extent to which the landscape is free from visual encroachment.

Inter-visibility:
The principle that from any point visible to an observer, the observer can also be seen.

Landmarks:
Another type of point reference, but in this case the observer does not enter within them, they are external. They are usually a rather simply defined physical object: building, sign, store or mountain. Some landmarks are distant ones, typically seen from many angles and distances, over the tops of smaller elements, and used as radial references. They may be within the city or at such a distance that for all practical purposes they symbolize a constant direction. (Lynch)

Landscape:
Landform and landcover forming a distance visual pattern. Landcover comprises water, vegetation and manmade development, including cities.

Landscape Control Points:
A network of permanently established observation sites which provide the means of studying the visual impact of alternations to the landscape. (Similar terms: Observation Points, Observer Viewpoints). (Litton)

Landscape Form:
A landform or landcover mass composed of heterogeneous visual elements, but distinguished from surrounding areas by overall form, pattern, and edge. Landscape forms have physical dimensions and a specific location. They also often have names: Bunker Hill is a named landform mass; Boston is a named area of landcover.

Landscape Type:
An area of landform plus land cover forming a distinct, homogeneous component of a landscape, differentiated from other areas by its degree of slope plus a single pattern of landcover.

A landscape type is a unique segment of the environment. This segment or portion of the environment can be separated from other segments on the basis of the land cover and the landform. Any landscape type can be subdivided into unique landscape sub-types, through definition of the desired homogeneity of the landscape type. For example, a forest is composed of different tree types, and each tree is itself made up of branches, a trunk and foliage and so on. (Vaughn)

Landscape Unit:

a. An area or volume of distinct landscape character which forms a spatially enclosed unit at ground level; it may include more than one landscape type; outdoor room.

b. The extent of a single landscape type which is not spatially enclosed at ground level.

Line:
Geometrically, a point that has been extended, or the intersection of two planes, e.g., a silhouette, or a boundary between patterns in the landscape. The second strongest of the four basic visual pattern elements.

Local Values and Goals:
The landscape setting and its visual resources may be valued by local viewer groups for reasons not evident in an assessment based strictly on visual resources and not widely known outside the community.

Management Principles:

Protect: To guard, maintain, prevent impact (U.S.F.S. "preservation").

Enhance: To augment, heighten positive impact, improve above a standard (U.S.F.S. "enhancement").

Conserve: To utilize with minimum impact on a standard (U.S.F.S. "retention").

Mitigate: To alleviate, moderate negative impact, upgrade to an acceptable standard (U.S.F.S. "modification" and "rehabilitation").

Nodes:
Points, the strategic spots in a city into which an observer can enter, and which are the intensive foci to and from which he is traveling. They may be primarily junctions, places of a break in transportation, a crossing or convergence of paths, moments of shift from one structure to another. Or the nodes may be simply concentrations, which gain their importance from being the condensation of some use or physical character. (Lynch)

Observer Position:
A term employed to describe the observer's elevational relationship between himself and the landscape he sees. It is used to indicate if he is essentially below, essentially at the same level, or essentially above the visual objective. Three specific terms are used: 1) observer inferior, viewer below object; 2) observer normal, viewer on level of object; 3) observer superior, viewer above object.

Observer Viewpoint:
A point from which a select view is analyzed and/or evaluated. Analogous concept: Landscape control point. (Litton)

Orientation:
The necessary information and opportunities to see significant features indicating location, direction, and progress. The needs of orientation are:

1) Sense of Location: The driver's awareness of his location in the environment at any point during travel.

2) Sense of Direction: The driver's sense of travel direction, both compass direction (north-south) and geographic direction (i.e., along the shore).

3) Sense of Progress: The driver's sense that he is making progress from his origin to his destination.

Physical orientation elements in the landscape that satisfy such needs are the following:

1) Landmark Feature: A prominent or conspicuous object in the landscape that serves as a guide.

2) Landmark Areas: An area having distinctive characteristics and definable boundaries that are useful to the traveler in determining where he is.

3) Linear Elements: Features in the landscape with directional characteristics because they lie on a perceived axis and/or connect other features.

(Hornbeck)

Paths:
The channels along which the observer customarily, occasionally, or potentially moves. They may be streets, walkways, transit lines, canals, railroads. For many people, these are the predominant elements in their image. People observe the city while moving through it, and along these paths the other environmental elements are arranged and related. (Lynch)

Pattern Character Compatibility:
The degree to which the visual character of the highway blends with that of the surrounding landscape, in terms of dominance, scale, diversity, and continuity; related to intactness and lack of encroachment.

Pattern Element Compatibility:
The degree to which the line, form, color and texture of the highway and related facilities conform, rather than contrast, to the basic visual pattern of the landscape setting; related to the vividness of the highway in its setting.

Scale:
Visual scale is the apparent size relationships between landscape components or features and their surroundings.

Sightline:
The unobstructed line of sight between an observer and viewed object.

Slope:
An area of landform surface differentiated from other areas by its degree of slope. It is a component of landforms but is not limited in place or extent. E.g.: cliff, gentle slope, flat plain. Analogous concept: Landtype (U.S.F.S.)

Texture:
The visual or tactile surface characteristic of various elements in the landscape; often the least dominant of the four visual pattern elements.

Uniqueness:
A resource-oriented criterion: a visual resource, visual character, or visual quality which is rare or uncommonly found at a regional or national scale.

Unity:
The degree to which the visual resources of the landscape join together to form a coherent, harmonious visual pattern. Unity refers to the compositional harmony or inter-compatibility between landscape elements.

Viewer Activity:
The extent of a viewer's ability to perceive the landscape and its detail may be heightened or decreased by the visual requirements of his current activity and his past experience of the landscape.

Viewer Awareness:
A viewer's receptivity to the visual character of the landscape can be affected by elements and relationships in the landscape setting itself or by expectations about the setting. Visual experience contrary to expectation may be suppressed or heightened, depending on the degree of disagreement.

Viewer Response:
Measures of viewer response to change in visual resources include viewer exposure, viewer sensitivity, cultural significance and local values.

Viewer Exposure:
The degree to which viewers are exposed to a view by their physical location, numbers viewing and duration of view.

Viewer Groups:
Classes of viewers differentiated by their visual response to the highway and its setting; response is affected by viewer activity, awareness and values.

Viewer Sensitivity:
The viewer's variable receptivity to the elements within the environment that he is viewing, affected by viewer activity and awareness. A person cannot readily notice every object and all the attributes of the objects that compose the total visual environment. Analogous concept: sensitivity level (U.S.F.S. and B.L.M.).

Viewshed:

1) All the surface areas visible from an observer's viewpoint.

2) Surface areas from which a critical object or viewpoint is seen.

Analogous terms: seen area, visible area.

Existing and Topographic Viewsheds:

a) Existing Viewshed: The area normally visible from an observer's viewpoint, including the screening effects of intermediate vegetation and structures.

b) Topographic Viewshed: The area which would be visible from a viewpoint based on landform alone, without the screening effect of vegetation and structures.

Composite Viewsheds:

a) Definition: Composite of overlapping areas visible from:
   - A continuous sequence of viewpoints along a road.
   - A network of viewpoints surrounding a road (or object).

b) The Visual Corridor: Each visually and spatially distinct experience.

View:
A scene observed from a given vantage point.

Visual Absorption:
The physical capacity of a landscape to screen proposed development and still maintain its inherent visual character. Two major factors affecting the absorption capacity of a landscape are: 1) the degree of visual penetration, and 2) the complexity of the landscape. The degree of visual penetration (i.e., the distance into the landscape that you can see from a vantage point) is affected both by vegetation and topography. The higher the visual penetration, the lower the ability of the landscape to visually absorb development and still maintain its existing visual character. Also, the higher the visual complexity within a landscape, the greater the visual absorption. (Vaughn)

Visual Alteration:
The degree of change in visual resources caused by highway development and operations, assessed without regard to viewer response.

Visual Assessment Units:
A portion of the area visible or potentially visible from a highway project or from which a highway project may be seen; to be useful in visual assessment, it should be identified on the basis of visual distinctions, such as landscape unit boundaries.

Visual Character:
The visual character of a landscape is formed by the order of the patterns composing it. The elements of these patterns are the form, line, color and texture of the landscape's visual resources. Their interrelationships can be objectively described in terms of dominance, diversity, continuity, and so on.

(Visual) Cognition:
The process of recognizing visual relationships among objects and between objects and their setting.

Visual Compatibility:
The degree to which development with specific visual characteristics is visually unified with its setting. Visual compatibility can be evaluated with reference to Pattern Elements and Pattern Character. Analogous concepts: contrast rating (B.L.M.), visual absorption criteria (U.S.F.S.), external harmony (Tunnard and Pushkarev).

Visual Corridor:
A continuous succession of visually and spatially distinct experiences.

Visual Impact:
The degree of change in visual resources and viewer response to those resources caused by highway development and operations.

Visual Information:
Visual information in a landscape is:

1) The identity of landscape components or features such as mountains, valleys, rivers, forests, towns or highways.
2) The message conveyed by signs and symbols in verbal or graphic form.

(Visual) Interpretation:
The process of judging or evaluating the visual appearance of objects and/or their setting.

Visual Pattern Elements:
Form, line, color, texture. Analogous term: dominance elements (U.S.F.S.).

(Visual) Perception:
The process of visually identifying and distinguishing objects from their setting.

Visual Quality:
While many factors contribute to a landscape's visual quality, they can ultimately be grouped under three headings: Vividness, Intactness and Unity. Analogous concepts: Scenery quality rating (B.L.M.), variety class (U.S.F.S.).

Visual Resource Management in the Highway Development Process:
Making and implementing decisions during the Highway Development Process which affect the visual resources of the highway and its setting and viewer response on character, content and quality of those resources.

Visual Resources:
The appearance of the features that make up the visible landscape. Includes the land, water, vegetative, animal, and other features that are visible on all national resource lands. (U.S.F.S.)

Visual Vulnerability:
The degree to which manmade changes might be seen in the landscape and their potential for degradation (of scenic quality)--in essence, the landscape's resistance or susceptibility to visual changes. (Litton)

Vividness:
The memorability of the visual impression received from contrasting landscape elements as they combine to form a striking and distinctive visual pattern.

VRM Needs:
The degree to which specific visual resources require management for specific viewer groups.

VRM Objective:
Statement of a Visual Resource Management result to be achieved, specifying:

1) management principle
2) measure of effect
3) visual resources to be managed
4) viewing group(s) for which resources are to be managed.

VRM Plan:
A specification of the management actions, timing, personnel, and financial resources by which given visual resources are to be managed, once a project has been geographically located.

VRM Unit:
A geographic unit for the management of visual resources; frequently identical to the assessment unit, or to a landscape type.

WSDOT
Visual Quality Assesment
Forms

Visual Quality Analysis

VIEW TO AND FROM PROJECT

Evaluation Scale

---comments---

VIVIDNESS

10	VERY HIGH
9	HIGH
7,8	MODERATELY HIGH
4,5,6	AVERAGE
2,3	MODERATELY LOW
1	LOW
0	VERY LOW

INTACTNESS

(MAN-MADE DEVELOPMENT)

10	NO DEVELOPMENT
9	LITTLE DEVELOPMENT
7,8	SOME DEVELOPMENT
4,5,6	AVERAGE LEVEL OF DEVELOPMENT
2,3	MODERATELY HIGH DEVELOPMENT
1	HIGH LEVEL OF DEVELOPMENT
0	VERY HIGH LEVEL OF DEVELOPMENT

(NATURAL ENVIRONMENT)

10	VERY HIGH
9	HIGH
7,8	MODERATELY HIGH
4,5,6	AVERAGE
2,3	MODERATELY LOW
1	LOW
0	VERY LOW

UNITY

10	VERY HIGH
9	HIGH
7,8	MODERATELY HIGH
4,5,6	AVERAGE
2,3	MODERATELY LOW
1	LOW
0	VERY LOW

VISUAL QUALITY ASSESMENT

VIEW FROM THE ROAD

10-Feb-97

			VIEW UNIT NUMBER (E=existing, P=proposed)	1 E	1 P	2 E	2 P	3 E	3 P	4 E	4 P	5 E	5 P	6 E	6 P	7 E	7 P	8 E	8 P	9 E	9 P	10 E	10 P	11 E	11 P	12 E	12 P	13 E	13 P	14 E	14 P	15 E	15 P
LEVEL 1			GENERAL VISUAL QUALITY																														
			SPECIAL FEATURES																														
L E V E L 2	VIVIDNESS	I	LAND																														
			WATER																														
			VEGETATION																														
			MAN-MADE																														
			AVERAGE I	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		II	LAND																														
			WATER																														
			VEGETATION																														
			MAN-MADE																														
			AVERAGE II	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		III	LAND																														
			WATER																														
			VEGETATION																														
			MAN-MADE																														
			AVERAGE III	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	INTACTNESS	I	MAN MADE																														
			NATURAL ENVIRONMENT																														
			AVERAGE I	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		II	MAN MADE																														
			NATURAL ENVIRONMENT																														
			AVERAGE II	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		III	MAN MADE																														
			NATURAL ENVIRONMENT																														
			AVERAGE III	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	UNITY	I	MAN-MADE																														
			OVERALL																														
			AVERAGE I	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		II	MAN-MADE																														
			OVERALL																														
			AVERAGE II	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		III	MAN-MADE																														
			OVERALL																														
			AVERAGE III	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	AVERAGES		WITHIN R/W	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			OUTSIDE R/W to NATURAL BREAK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			NATURAL BREAK to INFINITY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	FACTOR		LEVEL OF IMPORTANCE																														
			.																														
			.																														
	SUB-TOTAL		WITHIN R/W	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			OUTSIDE R/W to NATURAL BREAK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			NATURAL BREAK to INFINITY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL VISUAL QUALITY				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VIEW UNIT NUMBER (E=existing, P=proposed)				1 E	1 P	2 E	2 P	3 E	3 P	4 E	4 P	5 E	5 P	6 E	6 P	7 E	7 P	8 E	8 P	9 E	9 P	10 E	10 P	11 E	11 P	12 E	12 P	13 E	13 P	14 E	14 P	15 E	15 P

VISUAL QUALITY ASSESMENT

VIEW TOWARD THE ROAD

SR

10-Feb-97

			VIEW UNIT NUMBER (E=existing, P=proposed)	1 E	1 P	2 E	2 P	3 E	3 P	4 E	4 P	5 E	5 P	6 E	6 P	7 E	7 P	8 E	8 P	9 E	9 P	10 E	10 P	11 E	11 P	12 E	12 P	13 E	13 P	14 E	14 P	15 E	15 P
LEVEL 1			GENERAL VISUAL QUALITY																														
			SPECIAL FEATURES																														
			LAND																														
			WATER																														
			VEGETATION																														
			MAN-MADE																														
			AVERAGE I	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			LAND																														
			WATER																														
			VEGETATION																														
			MAN-MADE																														
			AVERAGE II	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			LAND																														
			WATER																														
			VEGETATION																														
			MAN-MADE																														
			AVERAGE III	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			MAN MADE																														
			NATURAL ENVIRONMENT																														
			AVERAGE I	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			MAN MADE																														
			NATURAL ENVIRONMENT																														
			AVERAGE II	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			MAN MADE																														
			NATURAL ENVIRONMENT																														
			AVERAGE III	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			MAN-MADE																														
			OVERALL																														
			AVERAGE I	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			MAN-MADE																														
			OVERALL																														
			AVERAGE II	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			MAN-MADE																														
			OVERALL																														
			AVERAGE III	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			WITHIN R/W	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			OUTSIDE R/W to NATURAL BREAK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			NATURAL BREAK to INFINITY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			LEVEL OF IMPORTANCE																														
			WITHIN R/W	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			OUTSIDE R/W to NATURAL BREAK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			NATURAL BREAK to INFINITY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			TOTAL VISUAL QUALITY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			VIEW UNIT NUMBER (E=existing, P=proposed)	1 E	1 P	2 E	2 P	3 E	3 P	4 E	4 P	5 E	5 P	6 E	6 P	7 E	7 P	8 E	8 P	9 E	9 P	10 E	10 P	11 E	11 P	12 E	12 P	13 E	13 P	14 E	14 P	15 E	15 P

LEVEL 2: VIVIDNESS, INTACTNESS, UNITY

AVERAGES

FACTOR

SUB-TOTAL