Visual Impact Assessment Handbook

Caltrans

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List of Acronyms and Abbreviations

AASHTO	American Association of State Highway and Transportation Officials
AMMM	Avoidance, Minimization and/or Mitigation Measures
AVE	area of visual effect
BRWL	blue-rich white light lamps
BUG	Backlight-Uplight-Glare
CAD	computer-aided design
Caltrans	California Department of Transportation
cd	candela
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
Checklist	CEQA Aesthetics Checklist
CMS	Changeable Message Signs
DSM	Digital Surface Model
DTM	Digital Terrain Model
EPA	U.S. Environmental Protection Agency
FHWA	Federal Highway Administration
GIS	Geographical Information System
GPS	global positioning system
Guidelines	*Guidelines for the Visual Impact Assessments of Highway Projects*
HAoV	Horizontal Angle of View
I-405	Interstate 405
IES	Illuminating Engineering Society
IESNA	Illuminating Engineering Society of North America
LiDAR	light detection and ranging
mm	millimeter
MP	megapixels
NEPA	National Environmental Policy Act
NGO	nongovernmental organization
PDT	Project Development Team
PS&E	Plans, Specifications, and Estimates
Questionnaire	Questionnaire to Determine VIA Level
SER	Standard Environmental Reference
SHPO	State Historic Preservation Offices
SI	International System of Units

SRRA	Safety Roadside Rest Areas
SRE	Scenic Resource Evaluation
VAoV	Vertical Angle of View
VIA	Visual Impact Assessment
VIAHP	*Visual Impact Assessment for Highway Projects*

Statement of Limitations

This Visual Impact Assessment (VIA) Handbook has been prepared by the California Department of Transportation with the support of AECOM consultants. The contributors are as follows:

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1. Introduction

The California Department of Transportation (Caltrans) developed this Visual Impact Assessment (VIA) Handbook based on the Federal Highway Administration's (FHWA's) new guidelines (2015), the California Environmental Quality Act (CEQA) Aesthetics Checklist (*Checklist*), and VIA best practices. The purpose of the VIA Handbook is to describe Caltrans' current standard process for assessing visual impacts.

Caltrans is obligated to consider aesthetic impacts of its actions under CEQA, and where there is a federal nexus, visual impacts under the National Environmental Policy Act of 1969 (NEPA). FHWA first published *Visual Impact Assessment for Highway Projects* (VIAHP*)* in 1981 (FHWA 1981/1990), and it became widely used and accepted as the authoritative procedural document for transportation projects. Three decades later, the Transportation Research Board sponsored a review of VIA practices applied to transportation projects (Churchward et al. 2013) that led the FHWA to prepare *Guidelines for the Visual Impact Assessment of Highway Projects* (*Guidelines*) (FHWA 2015). The FHWA recognizes the application of these procedures as fulfilling its NEPA responsibility for VIA. For NEPA and CEQA, public disclosure of impacts is the basic requirement, and a VIA must clearly state what the visual impacts of a project are and what measures are required to reduce those impacts.

To reflect the FHWA's new *Guidelines*, CEQA aesthetics requirements, and VIA best practices, Caltrans has updated its current VIA methodology and procedures, and developed this statewide VIA Handbook to describe them in detail.

Figure 1-1 summarizes the main tasks in each of the four phases of VIA preparation. The VIA Handbook is organized as follows:

Section 2. Establishment Phase

This section presents information on how to scope the necessary level of effort and gather the necessary resources. The Establishment Phase section consists of seven tasks that establish a framework for the assessment: (1) VIA scoping questionnaire preparation, (2) project visual character and quality assessment, (3) area of visual effect (AVE) development, (4) landscape units delineation, (5) scenic and visual resources identification, (6) preliminary identification of key views, and (7) regulatory, public agency, and public coordination. During the Establishment Phase, key views are tentatively identified to be verified and updated during the fieldwork that will occur later during the Inventory Phase. The Establishment Phase is primarily a desktop review of existing documents. There may be a site visit during the Establishment Phase, but serious fieldwork typically occurs in the Inventory Phase.

Section 3. Inventory Phase

This section describes documentation of the baseline condition through five activities: (1) baseline field documentation and photography, (2) landscape visual character assessment; (3) key views review and refinement with a focus on landscape units, scenic and visual resources, AVE verification, and daytime and nighttime lighting levels;

(4) landscape visual quality assessment; and (5) characterization of potential viewers. During the Inventory Phase, the project's visual character and quality are updated as information about the design evolves and becomes known to the VIA team. The Inventory Phase is primarily focused on fieldwork, gathering field data, and verifying the documents developed in the Establishment Phase, such as the accuracy of the AVE, quality of the selected key views, and boundaries of the landscape units.

Section 4. Analysis Phase

This section presents the basis for the VIA report that identifies the project's visual impacts based on the assessment of visual change and visual sensitivity. This phase consists of nine main activities: (1) project impact visualizations preparation, (2) assessment of visual compatibility, (3) contrast, (4) evaluation of visual change, (5) assessment of viewer sensitivity, (6) viewpoint sensitivity, (7) evaluation of visual sensitivity, (8) determination of visual impact, and (9) VIA report preparation.

Section 5. Mitigation Phase (Environmental Commitments)

This section discusses the Mitigation Phase, during which environmental commitment measures to reduce adverse visual impacts are proposed. The measures are categorized as avoidance, minimization, compensation, and enhancement. Note that the term "mitigation" as used here is not used in the CEQA sense of the word, but is a required term for this phase, per the FHWA guidelines. The term "mitigation" may also apply to other measures, and for CEQA, it applies only to significant impacts. Examples of measures from each category are provided. Once these measures are developed, the VIA report is finalized and submitted to the Project Development Team (PDT) and the environmental planner to be incorporated into the environmental documents.

Section 6. References

This section lists all references used in this report.

Section 7. Glossary

This section defines and clarifies key VIA terms used in this report.

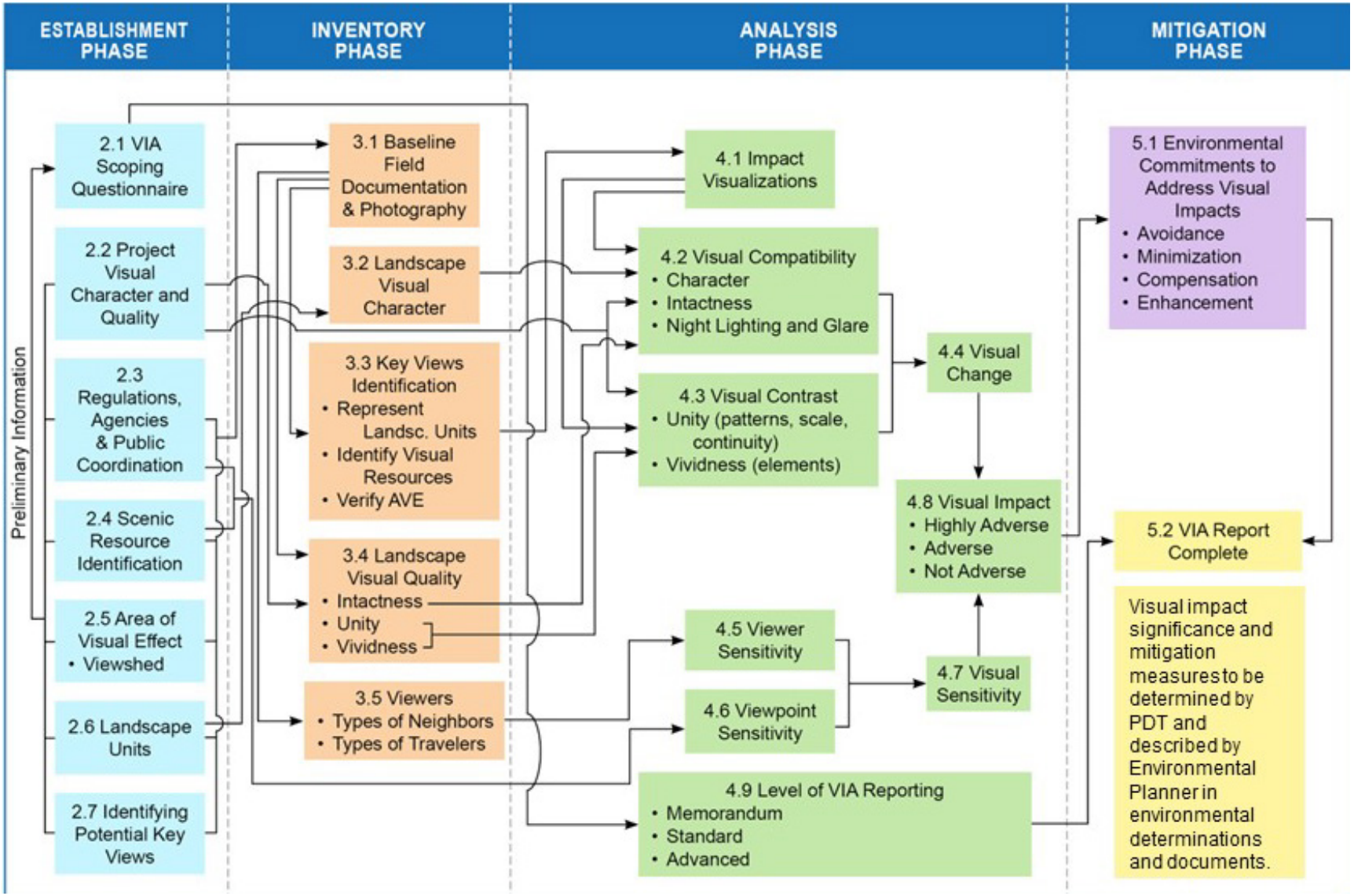

Figure 1-1: VIA tasks and activities diagram

1.1 Caltrans VIA Process

Caltrans' VIA methodology connects to the overall framework of phases included in the *Guidelines* and includes CEQA aesthetic review requirements. The foundation for Caltrans' approach to preparing effective VIAs is rooted in the following actions:

- Encourage interdisciplinary team participation.
- Apply context-sensitive approaches to guide the identification of natural and cultural/human-made landscape features and sensitive viewers, and for the evaluation of visual quality.
- Involve agencies and the public in the VIA process.
- Communicate graphically through maps, site photographs, cross sections, 3D visualizations, and animation.
- Identify adverse and beneficial visual impacts.
- Establish effective environmental commitments.

1.2 Caltrans VIA Process Key Reference Documents

The primary documents used to prepare this VIA Handbook are the following:

- Guidelines for the Visual Impact Assessment of Highway Projects (FHWA 2015)
- CEQA (Public Resources Code Section 21000 et seq.) and the CEQA Guidelines (California
  Code of Regulations, Title 14, Division 6, Chapter 3, Section 15000 et seq.), including the *Checklist* (Appendix G)
- Standard Environmental Reference (SER), Chapter 27: Visual and Aesthetics Review, including the section on the Scenic Resource Evaluation (SRE) for project sites located within the limits of an officially designated State Scenic Highway or a highway eligible for designation.

The full list of references is provided in Section 6 of this report.

2. Establishment Phase

The Establishment Phase is primarily a desk assessment, although a site visit may occur on large or unusual projects to better orient those working on the project VIA. The purpose of the Establishment Phase is for the VIA preparer to assemble a general understanding of the project's scope by completing the VIA Scoping Questionnaire, determining the AVE, and delineating landscape units; distinguishing important visual characteristics through establishment of visual character and quality; and determining the project's potential impacts by establishing scenic resources, key views, and relevant state, regional, and local regulations.

2.1 VIA Scoping Questionnaire

The VIA preparer should use the VIA Scoping Questionnaire to complete a preliminary evaluation of the project's visual characteristics and use a series of scored questions about the project's visual impacts to determine the necessary level of VIA reporting. The VIA preparer should use the VIA Scoping Questionnaire as a tool to understand a project's general elements, context, and potential impact.

To fill out the online VIA Scoping Questionnaire (Questionnaire to Determine Visual Impact Assessment (VIA) Level | Caltrans) based on an understanding of the project scope and potential adverse impacts, the VIA preparer should:

- Identify project features with the greatest visual effects.
- Describe anticipated future conditions of visual resources within the VIA study area.
- Identify future visual resources considered to be at risk once the project is implemented.
- Incorporate and document stakeholders (i.e., local or federal agencies) and public input.

The VIA Scoping Questionnaire distinguishes three levels of VIA reporting: Memorandum, Standard, and Advanced. The Annotated Outline template of the appropriate level should be used to guide the preparation of reports and the directions for their preparation closely reviewed (Directions For Using VIA Annotated Outlines | Caltrans), but the VIA preparer has discretion in applying the VIA Scoping Questionnaire score and adapting the report's Annotated Outlines based on a project's circumstances.

2.2 Project Visual Character and Quality

It is necessary to first understand and describe the visual character and visual quality of the project and area within the project limits. A project's visual character pertains to its natural and cultural elements and features, including its construction and operation appearance, location, scale, form, and materials. Visual character also includes information about potential new sources of substantial lighting and glare. Use the Annotated Outlines to guide the description of project visual character:

Select the main visible project elements of each project alternative, such as grading (cut and fill slopes), structures, drainage, rock cuts, roadside vegetation, sound barriers, etc., and describe their visual attributes (form, line, color, and texture) along with the relationships (dominance, scale, diversity, and continuity) among them. Consider potential seasonal as well as daytime and nighttime conditions and add additional element attributes and relationship descriptions if necessary. Similarly, describe the visual character of each alternative (if there are noteworthy differences between alternatives). An example project visual character description is provided below for the highway project shown in Figure 2-1.

Figure 2-1: Highway project example

Sample Project Visual Character Description

The main visible elements of the project shown in Figure 2-1 are several concrete overpass structures, tall light poles, and a large, vegetation-covered retaining wall. The concrete overpass structures have straight horizontal and sinuous trapezoidal prism forms; their prevailing lines are horizontal and wavy, they are gray, and they are made of smooth-textured concrete with coarser ornamental bands along the exterior of the concrete guardrails. The light poles have thin cylindrical forms with prevailing vertical lines, their color is gray, and they are made of galvanized steel with smooth texture. The

retaining wall has a vertical planar form with prevailing, slightly sinuous horizontal lines. Because the wall is covered with climbing vines, its color is dark green, and its texture is coarse. The three main visible elements are very diverse and discontinuous; however, the concrete arching overpass dominates the view because of its curvilinear shape, which strongly contrasts with the rectilinear shapes and lines surrounding it. The vegetation-covered retaining wall is subdominant, because its dark green color stands out against the light gray background of the concrete structures and pavement; even during the winter the vine would provide a branching pattern and color to the concrete structures.

2.3 Regulations, Agencies, and Public Coordination

NEPA was established, in part, to "assure for all Americans safe, healthful, productive, and aesthetically and culturally pleasing surroundings" Sec. 101 [42 U.S.C. § 4331]. NEPA is the primary governing rule that established the country's national environmental policy and requires federal agencies to undertake an assessment of the environmental effects of their proposed actions prior to making decisions. Visual impacts are included among those environmental effects. Mitigation measures necessary to mitigate adverse impacts resulting from the proposed action are to be incorporated into the proposed action, and the costs may be eligible for federal funding as described in the applicable federal regulation (23 Code of Federal Regulations (CFR) 771.105(e)). Various other federal laws and programs deal with areas throughout the country that have been recognized for their scenic values.

The VIA preparer should analyze requirements associated with these laws and the scenic values of the resources they protect when conducting the VIA. These laws include the Federal-Aid Highway Act of 1970, the National Scenic Byways Program, National Scenic Areas, the Wild and Scenic Rivers Act, the National Trails System Act, National Monuments, the National Historic Preservation Act, Section 4(f) of the Department of Transportation Act of 1966, and Section 6(f) of the Land and Water Conservation Fund Act. State, local, and regional plans and policies pertaining to visual resources are also considered when addressing the requirements of NEPA. California has its own environmental impact assessment law, CEQA, which clearly defines the need to conduct a VIA. Many cities have planning documents that address aesthetic impacts. In addition, regional and local authorities will have plans and regulations that relate to scenic resources and visual impacts. It is a best practice for the VIA to consider local ordinances concerning scenic resources and aesthetic guidelines.

2.4 Scenic Resource Identification

A SRE is required when a project site is "located within the limits of an officially designated State Scenic Highway" or eligible scenic highway, to prevent project impacts negatively impacting the eligibility status of a potential scenic highway. Refer to the SER, Volume 1: Guidance for Compliance, Chapter 27: Visual and Aesthetic Review, for the process for conducting an SRE (Caltrans 2020).

A potential list of informational materials that can aid identification of scenic resources in the vicinity of a project area is provided in Appendix A, Identifying Scenic Resources.

Scenic and visual resources can be both places (such as scenic byways, parks, and historic sites) and features (such as trees and rock outcroppings). It is important to distinguish between scenic and visual resources in the VIA report. Even though the SER guidance for interpreting the scenic resources (places and features) within a State Scenic Highway corridor is very detailed, based on CEQA, it is not exclusive to scenic highways and provides guidance for other areas with scenic resources. In addition, the SER guidance should not be interpreted as meaning that other places or features could not be considered a "scenic resource." A broad general interpretation of the term "scenic resource" is acceptable.

2.5 Area of Visual Effect

The AVE is the sum of the viewsheds of all travelers with views from the road and all neighbors with views of the road. The AVE is the result of the intersection between the physical constraints of the environment and the physiological limits of human perception. The environment is physically constrained by landform, land cover, and atmospheric conditions (FHWA 2015). Landform is the most basic constraint and the one least likely to be modified, and is therefore the most important physical constraint in establishing an AVE. It is best understood using a topographic map imposed on a satellite image of the project vicinity or through a digital terrain model (DTM). Land cover is critical for determining the physical constraints of the environment. Vegetation and human-made structures can be obstacles blocking views but can also, as in the case of occupied buildings, often substantially expand views. Atmospheric conditions such as smoke, dust, fog, low clouds, rain, or snow can drastically reduce visibility and should be recognized and compensated for when developing the boundary of a viewshed. If photo simulations are being developed, time of year should be considered if it impacts visibility. For instance, the time of year can influence deciduous vegetation, sun angle, and prevailing weather conditions. The photo simulation(s) should represent the prevailing weather and climate conditions at the project location. Additionally, a discussion of the range of other potential conditions throughout the year should be provided.

The AVE may be influenced by surrounding topography, vegetation, and structures (*Guidelines*). Viewsheds that are based only on landform and not constrained by any other obstacles generate the largest possible AVE. That is why they have traditionally been used to analyze visual impacts—they allow for the "worst-case" scenario. Most landscapes, however, contain some vegetation or structures that obscure views and restrict the potential viewshed. Therefore, viewshed analysis that is developed in the office based on surveyed topography or digital terrain models will need to be verified during the Inventory Phase (FHWA 2015).

There is a substantial difference in determining AVE in urban and natural environments. The extent of the viewshed outside of the project is limited to the distance where the project remains clearly apparent to viewers. In flatter natural areas, visual obstructions typically restrict views to only a few miles, even on a clear day. The AVE may be composed of non-adjacent discrete areas, and even discrete, distant elevated viewpoints.

Using terrain (i.e., a DTM) and surface cover (i.e., a DSM) elevation data derived from high-resolution light detection and ranging (LiDAR) when available, it is possible to accurately model project viewsheds and screening attributed to different types of land cover. Use these same DTM and DSM data to quickly create basic perspective illustrations of the view from any selected location. For further details about photography, refer to Appendix D.

2.6 Landscape Units

Landscape units are the specific geographical areas within the AVE for which visual impacts are assessed. A landscape unit is typically composed of multiple landscape types but has a distinct visual character, visual quality, and viewer type. A landscape unit will often correspond to a place or district that is commonly known by local viewers. A landscape unit has a characteristic pattern (e.g., towns, agricultural fields, forests, lakes), and there are landscape character areas within the landscape unit that are visually more homogeneous (e.g., in urban areas they may be neighborhoods).

In the Establishment Phase, only the larger landscape unit or units are identified. Usually there is only one or two for a project. During the Inventory Phase, multiple landscape character areas may be identified within each landscape unit. Multiple landscape units are only involved in extended corridor projects through diverse landscape types (i.e., natural, rural, suburban, and urban).

To appropriately identify the number of landscape units and define their boundaries:

- Review the project scale and setting to determine if multiple landscape units are necessary.
- When there are multiple landscape units, define and map their boundaries within the AVE based on visibility and landscape types.

2.7 Identifying Potential Key Views

Key views encompass views both of and from the highway project area and are representative of the range of views that could be affected by the project. Key views are chosen to document an image of essential baseline conditions that will be used to assess the visual impacts of the project or to show that there may not be any visual change from the proposed project.

During the Establishment Phase, the VIA preparer should identify several potential key views that appear important based on desktop analysis of the project area and that could serve as the basis for the subsequent assessment of visual impacts. Key views can serve one of several purposes. They can represent clear unobstructed views of the project, particularly from designated scenic resources or public high-use areas. This type of view is often called a “worst-case” view. It is also important to have at least one key view that represents each landscape character unit. Occasionally it is important to have a key view to document that there is no or very limited visibility from a sensitive viewpoint.

In the narrative describing the key view, the VIA preparer should note why that location was chosen as a key view. Input from the public to identify potential key views is helpful because it ensures that the VIA addresses the public's concerns. One key view for each landscape unit may be sufficient for an accurate analysis, but two are preferred: one view of the road as seen by a representative neighbor and one view from the road as seen by a representative traveler. Use photographs from key views to support the document's narrative and to provide VIA readers with a visual understanding of what is being discussed. Select key views for their potential to provide images appropriate for simulations.

3. Inventory Phase

The Inventory Phase includes the identification of key information about the existing landscape, mostly accomplished in the field. The Inventory Phase is meant to confirm the findings of the Establishment Phase and add knowledge of the project through on-site documentation. The VIA preparer should use the standard field forms (Appendix B) to document each photograph of the project area, each landscape unit's visual character and quality, each key view, each scenic and visual resource, and all potential viewers. In addition, the AVE map developed in the Establishment Phase should be verified in the field, marked up, and updated for the Inventory Phase if there are discrepancies during the field observation of the AVE.

3.1 Baseline Field Documentation and Photographs

The Inventory Phase documents the baseline condition through photographs and written records.
During the fieldwork, a visual inventory of photos and descriptions is collected. The points where data are gathered, and photos are taken may be either randomly or systematically identified in the Establishment Phase or even identified in the field during the Inventory Phase. Once the field data inventory is completed, it serves as a basis for the selection of key views, refinement of the AVE, accurate delineation of landscape units, and other tasks. Typically, there are many inventoried locations that do not become key views. For Standard and Advanced reports, use the standard field forms (Appendix B) and keep a record of this documentation in the project file.

3.1.1 Base Photographs

The existing conditions should be documented with photography. At each viewpoint, use a GPS to determine and record the view's location and bearing. Photographs that will be used for visual simulations should be taken with a 50mm lens (40 degree HAoV) at a resolution of 1 pixel per minute of view, which equals 2,400 pixels in the horizontal direction and then stitched together to create a photo representing the primary human field of view. The primary human field of view typically targeted in simulations is 124 degrees horizontal and 55 degrees vertical. For instance, at least 3-4 photos should be taken horizontally in three vertical rows, assuming each is 40 degrees, to create a 124 H-degree x 55 V-degree photo. The viewer direction should account for the viewer's "primary viewing direction" - this is generally evident if the structures being simulated are not consistently in the center of the frame (though sometimes that can be legitimately the case).

The photograph should be taken:

- at the viewer's eye-level height (approximately 5.5 feet when standing and 3.5 feet when sitting in a car),
- with a depth-of-field that has all features in focus,
- in clear weather conditions, and

- at a time of day that provides optimal clarity and contrast.

The best practices listed above are mandatory for Advanced VIAs; for Standard and Memorandum VIA reports, the preparer should use their professional judgement to determine which standards are practical for a specific project. A form for recording field photography information is provided in Appendix B. For additional camera settings and photography specifications, see Appendix C.

3.2 Landscape Visual Character

The description of landscape visual character in the Inventory Phase is a continuation of the identification of landscape units in the Establishment Phase. Describe landscape visual character for each landscape unit at every inventoried location, not just at key views (Appendix B, Landscape Visual Character Description – Field Form). Determine landscape visual character based on the visual properties of the natural, cultural, and existing project environment visual features, and the relationships among these features. Landscape visual character is created by the way the physical features of the landscape come together and can be defined as “a distinct, recognizable and consistent pattern of elements in the landscape that makes one landscape different from another”. Although landscape character is also about experience and sense of place, it is not about opinions or judgement on whether one landscape is considered better or worse than another. Begin with information regarding the landscape unit’s character type, which can be natural, agricultural, rural, suburban, urban, or industrial. Use the basic ecoregion information on landform and natural plant communities from U.S. Environmental Protection Agency (EPA) Ecoregion description, and supplement it with observations of local landforms, topography, geology, soils, coastal features (where applicable), land cover, such as vegetation type, plant diversity, plant nativity, dominant species, water bodies and local hydrology to describe a natural landscape character type. Then describe cultural and existing project environment characteristics of each landscape unit. The landscape character descriptions should include some visual specificity, i.e., the relationships among the visible features, such as their scale, diversity, continuity, and dominance. Consider all visible elements within the project’s AVE, recognizing that visibility and perceived character may change due to distance, atmospheric conditions, and obstructions. If the proposed project includes new sources of light or potential glare, describe existing sources of lighting and glare to establish background levels.

Figure 3-1: Existing urban commercial landscape unit visual character description example

To illustrate the level of the visual character description detail expected in a VIA report, the following is a sample describing the project AVE and a landscape unit shown above in Figure 3-1. A highway project in Los Angeles (I-405 Sepulveda Pass Express Lanes Project) is in EPA Level IV Ecoregions 85c and 85d. The EPA states that Ecoregion 85 “includes coastal and alluvial plains and some low hills in the coastal area of Southern California and extends over 200 miles south into Baja California. Coastal sage scrub and chaparral vegetation communities with many endemic species were once widespread before overgrazing, clearance for agriculture, and massive urbanization occurred.” When applied to the project area, the VIA preparer should include the fact that the project is located near and within the Santa Monica Mountains of Southern California. The landscape is characterized by coastal and alluvial plains and some low hills, with coastal sage scrub and chaparral vegetation communities. The landscape visual character within the project AVE is primarily urban commercial and suburban residential mixed use in the southern end, natural/rural in the middle, and suburban residential again in the northern end.

The AVE consists of four distinct landscape units. The southernmost end of the project is an urban commercial landscape unit with many commercial, administrative (federal

government offices), educational (UCLA), and medical (Veterans Affairs Hospital) buildings. It is dominated by large and/or multi-story high-rise buildings, dense urban development, and numerous elevated highway structures. The landscape unit just north of this urban commercial landscape unit is suburban and is dominated by residential neighborhoods with small commercial centers and buildings. The central landscape unit of the project lies within the Santa Monica Mountains and includes the Sepulveda Pass, which cuts through them. It is distinctly natural and rural. Only a small number of large rural lot residences are strewn across the mountain ridges high above the freeway. In this landscape unit, there is a great contrast between the highway and the native vegetation-covered hills surrounding it. The northernmost landscape unit is within the south edge of San Fernando Valley and is suburban residential.

The southernmost urban commercial landscape unit main visual features are the Westwood Gateway towers (three white concrete high-rise buildings on the right in Figure 3-1)and the Penske Media Corp. (PMC) tower (dark glass building on the right behind the Westwood Gateway towers) on the east side of I-405. The west side of the freeway is dominated by the relatively short (six-story) but very large and prominent Greater Los Angeles Veterans Administration Healthcare building. Clusters of lush evergreen trees and palms are dispersed throughout the landscape unit.

The middle ground of the view outside of this landscape unit is dominated by the 16-story Hotel Angelino and the Getty Museum and Research Institute. The background is formed by the sparsely vegetated ridges, hills, and steep slopes of the Santa Monica Mountains. The primary form of the prominent buildings within the landscape unit is rectangular prism, and the prevailing lines are horizontal and perpendicular to the roadway. The prevailing color of the structures is white with some buildings' cladding and reflective windows appearing dark blue or black, contrasting starkly with their white facades. The texture of all buildings is smooth.

Large clusters of trees (right and left sides of the photo in Figure 3-1) form the secondary visual feature within this landscape unit. The form of the vegetation is either highly heterogeneous where palm trees enter the mix or rounded and globular where broadleaf evergreens prevail. The only lines visible in the vegetation clusters are the slightly leaning, almost vertical trunks of palm trees reaching for the sky. The color of the vegetation is dark green, and its texture is medium to coarse. The dark green foliage contrasts strongly with the white concrete of the buildings, not only in color but also in texture. The landscape unit is highly diverse and heterogeneous.

3.3 Key Views

The primary documentation of existing visual quality is with photographs that have been geotagged using a GPS. These geotagged photos should display key views that represent clear views of and/or from the project within each landscape unit at varying distances. In addition, there should be photographic documentation of potential views from and/or of scenic or visual resources. Any additional potential key views should be identified during the Inventory Phase fieldwork. These photographs will provide important reference material during the preparation of the VIA. Their value is enhanced by using standard field forms (Appendix B, Key View Inventory Form and Photo

Documentation Form) that further document the attributes of each viewpoint's setting. The level of documented detail should be proportionate to the level of the VIA report.

The VIA preparer should aim for a broad selection of view types while avoiding duplication. A number of views well distributed through the project area should be included. Each landscape unit and scenic and visual resource should be represented, as well as views of the project from them. The broad baseline photographic inventory created during this phase will be used in the Analysis Phase to select appropriate key view photographs for photo simulations, if they are needed.

Implement the following three-stage method for selecting key views to support a VIA development and visual impact determination:

1. In the Establishment Phase, a topographic map should be superimposed over an aerial, GIS, or Google Earth Pro desktop viewshed to identify the potential AVE, its landscape units, potential viewpoints, and key views associated with looking at and looking from the project.
2. An Inventory Phase field survey should be conducted to validate, add, or winnow out key views based on local sensitivity, public access and frequency, presence of scenic and visual resources, potential of scenic views to be blocked by the project, neighbors' and travelers' cone of vision, distance, or other visibility factors that either increase or diminish the importance of a key view.
3. A final, careful key view selection should be performed during the Analysis Phase. Only key views that are broadly representative of the project from important public view areas should be selected. This selection process should remove any redundant views.

The initial list of key views should be based on a preliminary "as seen" area viewshed assessment within an AVE. This list is subject to change as more detailed information is gathered or provided by the design team. Preliminary analysis can include discussions with key stakeholders and cultural resources specialists, and review of various documents that may identify important key views or viewpoints. It should be comprehensive. That is, the preliminary analysis should err on the side of too many versus not enough potential key views to avoid overlooking what may turn out to be an important key view, which would require additional work to be done later.

For further guidance on selecting key views, refer to Appendix E. For best practices regarding photography documentation, refer to Appendix C. Figures 3-2, 3-3, and 3-4 provide examples of good and poor key views.

Figure 3-2: Good quality key view from AVE as seen by neighbors.

- Provides relatively unobstructed view of major design elements.
- Represents view of the neighbors from a publicly accessible area.

Figure 3-3: Good quality key view from roadway as seen by travelers.

- Provides relatively unobstructed view of project.
- Represents view of the travelers from a public roadway.

Figure 3-4: Poor quality key view

- Design elements are partially obstructed.
- Represents a view that is not publicly accessible on a vegetated slope.
- Does not show all potentially visible elements and features of the project

3.3.1 Represent Landscape Units

There should be at least one key view representing each landscape character unit that was identified in the Establishment Phase.

3.3.2 Identify and Represent Scenic Resources

Scenic resources are generally understood as public places recognized for their scenic quality or deserving protection from adverse visual change or visual impacts to users enjoying their visual quality. They are often designated or otherwise recognized by a public authority or visual quality experts for their scenic qualities. For instance, parks and recreation facilities are identified and protected under Section 4(f) of the Department of Transportation Act of 1966 and Section 6(f) of the Land and Water Conservation Fund Act. Historical sites are protected under Section 106 of the National Historic Preservation Act. Note however that resources protected under these laws are not automatically considered scenic resources but may have features and attributes that would be considered scenic resources. In addition, state, local, regional, tribal organizations or NGOs, and visual quality experts may designate scenic resources in plans, regulations, or studies. Scenic resources and their users are considered sensitive to visual impacts and are due special consideration in VIAs. Refer to Section 2.5 and Appendix A for more information regarding scenic resources.

In the Establishment phase, designated scenic resources are identified from existing databases. During the Inventory Phase, those areas are documented during field work, and other scenic and visual features are identified (e.g., heritage trees, rock

outcroppings, historic buildings, park areas, and nature reserves). These features are important for the VIA analysis because the project may have the potential to directly affect them if they are in or very close to the project boundary.

Preparation of a SRE is described in the SER, Volume 1: Guidance for Compliance, Chapter 27: Visual and Aesthetics Review (Caltrans 2020).

The SER guidance for a SRE can be applied during the Inventory Phase for any project and may be sufficient for the Memorandum VIA. However, the more advanced level VIA reports require a review of local, state, and federal databases of scenic resources, as described in Appendix A. Consider ways to integrate public input regarding scenic resources the community recognizes and values into the VIA.

3.3.3 Identify Visual Resources

During field review of the AVE, identify visual resources that do not fit the definition of a scenic resource (of being officially designated or recognized by a government agency or an NGO), but enhance or contribute to the visual quality and character of the project or the cultural or natural environment. These visual resources should be protected; where they are publicly visible and valued by the neighbors, prepare key views and photo simulations (required for Advanced VIA reports, optional for Standard and Memorandum reports) that will show their condition after the project is completed.

3.3.4 Verify AVE

The Establishment Phase AVE map should be verified in the field and marked up if there are discrepancies between the desktop-generated AVE on the map and the actual AVE observed in the field. This may be caused by new buildings, roadways, utilities, grading, landscaping, or natural vegetation that obstructs the view of or from the project.

3.4 Landscape Visual Quality

Visual quality is the viewers' overall aesthetic impression of a view or landscape. Consider the intactness, unity, and vividness of natural, cultural, and existing visible project environments:

- **Natural Environment:** Includes land, water, vegetation, animals, and atmospheric conditions.
- **Cultural Environment:** Includes buildings, infrastructure, other structures, and art or artifacts.
- **Existing Project Environment:** Includes natural and cultural elements within the project boundary; includes ROW grading, constructed elements, highway planting and other vegetation cover, and ancillary visual features.

Within each landscape unit, identify these environments and describe their intactness, unity, and vividness from each key view. Intactness, unity and vividness are the most useful visual quality attributes that are widely used and accepted. None of them is itself equivalent to visual quality. All three must be high to indicate high visual quality. Fill out field forms with detailed descriptions of visual quality and references to photos for each

key view and landscape unit. A brief description is sufficient for the Memorandum VIA. Include a good description to evaluate the qualities of intactness, unity, and vividness in the Standard VIA Report. For the Advanced VIA Report, provide a detailed description and use a descriptive ordinal rating.

The description of the existing visual quality attributes in the Inventory Phase requires two approaches or ways to consider the attributes. The first approach is wholistic and addresses intactness; the second approach is atomistic and evaluates the view by deconstructing it into constituent parts and describing their unity and vividness.

3.4.1 Intactness

Intactness (Figures 3-5, 3-6, and 3-7) describes the sense of place or landscape character and is the degree to which the viewed landscape represents the desired landscape character type's visual integrity. Are there intrusive features that do not belong or "fit"? Are there characteristic or defining features that are absent? Is the landscape character impacted by existing features that are inconsistent with the landscape character? What are the quality and condition of the features in the view?

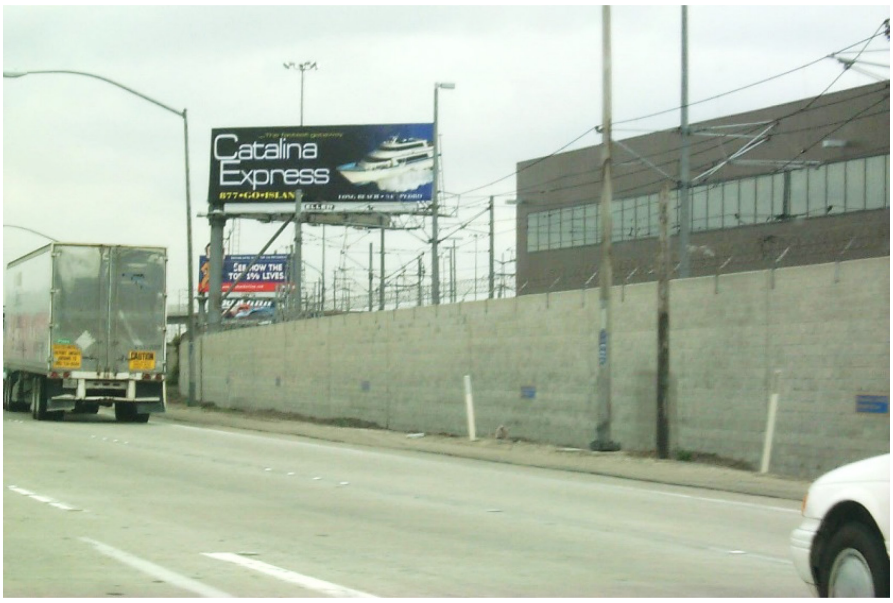

Figure 3-5: Low intactness

- Contains distracting features.
- Has low visual quality.
- Intrusive features do not enhance existing character.

Figure 3-6: Medium intactness

- Does not contain extraneous features.
- Landscape features complement road's function and legibility.
- Does not have distractions.

Figure 3-7: High intactness

- Roadway's visual prominence is low key to allow the natural context to be dominant.
- Does not contain extraneous features.
- Design enhances existing character.

3.4.2 Unity

The description of Unity (Figures 3-8, 3-9, and 3-10) in the Inventory Phase deconstructs the spatial composition of the view's landscape features and notes whether they exhibit a consistent and pleasing arrangement of parts; it concerns visual harmony, order, and coherence. Do the features in the view seem well ordered and balanced? Are the features in scale with each other? Is there an important focal point or more than one focal point? Do the elements in the view seem well ordered and balanced? Are elements of the view in scale with each other? Do the colors in the scene work well together?

Figure 3-8: Low unity

- Design features are not harmonious with the landscape topography.
- Human-made changes detract from landscape features.

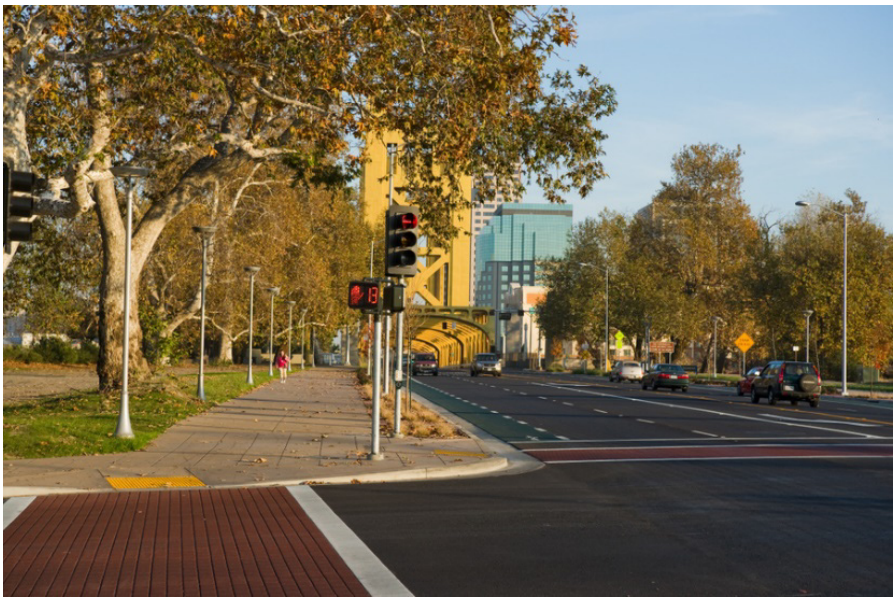

Figure 3-9: Medium unity

Design features are functional and well balanced.

Figure 3-10: High unity

- Design features are functional and modest.
- Visual harmony with surroundings is maintained.
- Wildlife crossing is vegetated and provides visual connectivity with the landscape, but maintains a modest visual impression, respecting and maintaining visual harmony with its surroundings.

3.4.3 Vividness

The description of Vividness (Figures 3-11, 3-12, and 3-13) deconstructs the view into its visual elements of line, form, color, and texture. The dominant visual elements are a primary determinant of what holds the viewer's attention or its memorability. Does the view have bold forms and lines? Do the colors work well together or are there memorable, striking colors or contrasts? Are there bold textures or moving features, such as flowing water?

Figure 3-11: Low vividness

- Design features are plain and unmemorable.
- They do not enhance the view.

Figure 3-12: Medium vividness

- The design features complement the landscape.
- They add visual interest without being distracting.
- This road is a calm interlude, with the trees in the center island breaking up the dominance of the road.
- The curve provides additional visual and kinesthetic interest.

Figure 3-13: High vividness

- The contrast in texture between the bridge and the vegetation is strong.
- The contrast in form between horizontal and diagonal features is strong.

- The contrast in color between the bridge concrete and surrounding vegetation is strong.

3.5 Viewers

The *Guidelines* distinguish between viewers who will use the transportation project (i.e., travelers), and viewers in the surrounding area looking at the transportation project (i.e., neighbors). Viewers should be generally characterized within each landscape unit, and more specifically identified for each key view, with some indication of their relative numbers or density. The AVE will provide some indication of viewer exposure to the project; additional characterization of the viewer types, number, and density must be developed during the Inventory Phase fieldwork.

It is understood that different types of viewers may place different importance on visual quality and have different sensitivities to visual change. The best source of information may come from the viewers themselves through public outreach meetings, neighborhood surveys, interviews at key viewpoints, or other means.

3.5.1 Types of Neighbors

Different types of neighbors are associated with different land uses, such as residential, recreational, institutional, civic, retail, commercial, industrial, or agricultural. Describe why the surrounding visual quality and view toward the project may be important to people engaged in the activities that are characteristic of the land use. In general terms, how many viewers are there in each neighbor group? How long or frequently are they expected to view the project?

3.5.2 Types of Travelers

The types of travelers can include commuters, tourists, truckers, bicyclists, and pedestrians while they are using the project. Describe the importance of the visual quality as seen from the road, considering the differences for each traveler group. This may require reference to the visual quality of the surrounding landscape and the attention demands of the traffic intensity. In general terms, how many viewers are there in each traveler group? How long or frequently can they be expected to have views from the project?

3.6 Viewpoints

Viewpoints can be vistas, open landscape views, ocean views, views of important mountains, views of historic or attractive buildings, rock outcrops, heritage trees, tree groves etc. The importance of each viewpoint is determined by the level of scenic resource designation, the distance of the scenic or visual resource, and the visual quality of the scenic or visual resource. The scoring requires a narrative, and you must include a descriptive rank, and a numeric rating.

4. Analysis Phase

The purpose of the Analysis Phase is to determine whether the visual change combined with visual sensitivity will result in a beneficial, adverse, or neutral visual impact, and to what degree. The VIA analytical procedure evaluates visual change by examining visual compatibility and visual contrast while considering them in relation to visual sensitivity as determined by evaluating viewer sensitivity and viewpoint sensitivity for each alternative, landscape unit and key view. The relationship of these components, shown in Figure 4-1, ultimately determines the visual impact of a project. Nine key activities are conducted in the Analysis Phase (Figure 4-1): (1) the impact visualizations are developed; (2) visual compatibility is described (and rated); (3) visual contrast is described (and rated); (4) visual change is described (and rated); (5) viewer sensitivity is described (and rated); (6) viewpoint sensitivity is described (and rated); (7) visual sensitivity is described (and rated); (8) the project's visual impact is described (and rated); and (9) the VIA report is prepared.

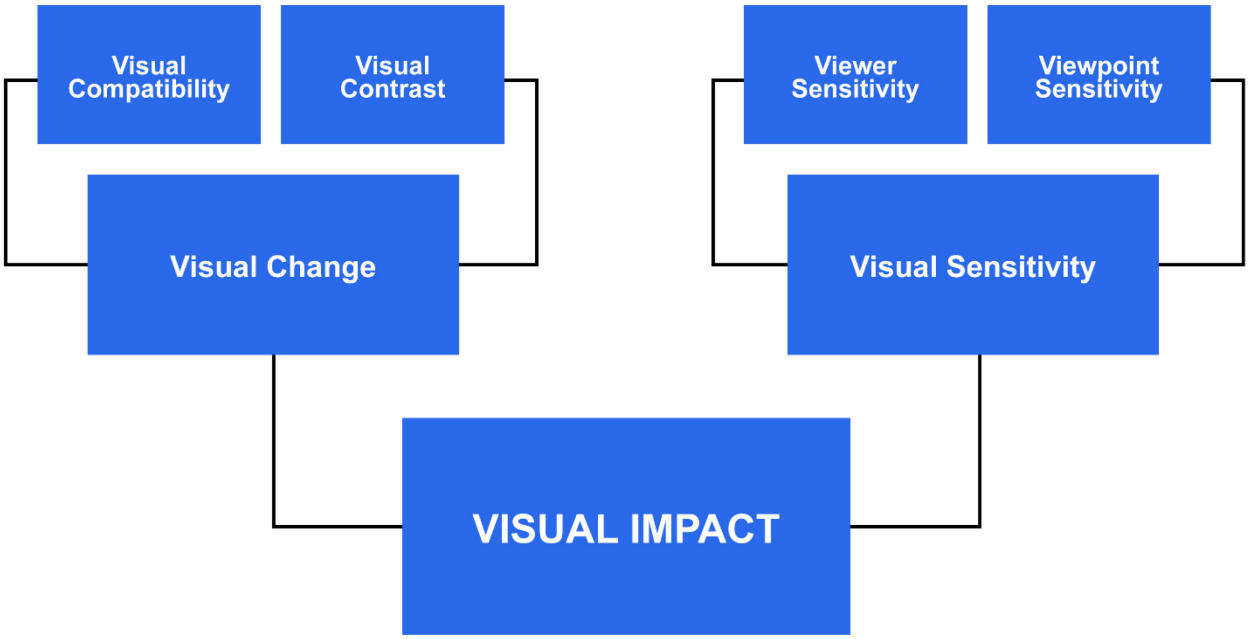

Figure 4-1: The relationship of the primary attributes to be evaluated to determine visual impact of a project during the Analysis Phase

4.1 Project Visualizations

Project visualizations are critical for understanding the proposed visual changes during and after construction. Visualizations can include maps and plans, illustrative elevations and cross-sections, or computer-generated perspective images using computer-aided design (CAD), drafting, or GIS data. However, for complex projects with adverse visual impacts, it would be beneficial to prepare photo-realistic simulations. Preferably, at least one photo simulation would be prepared for each selected key view from the project and of the project within each landscape unit, and additional simulations would be prepared

to represent the key view of and from sensitive scenic resources. The use of dynamic viewsheds and drive-by video simulations may be advantageous for complex or controversial projects. These final key views should be selected from a few other key views gathered in the Inventory Phase. This section presents basic standards for the creation of photo simulations for projects requiring an Advanced VIA.

Not every key view of every project necessitates a simulation; however, simulations should be prepared for controversial or complex projects with adverse visual impacts. In such cases, it is expected that at least one photo simulation would be prepared for each selected key view from the project and of the project within each landscape unit, and that additional simulations would be prepared to represent the key view of and from sensitive scenic resources. For details on how to prepare and present photo simulations, refer to Appendix F.

4.2 Visual Compatibility

Existing landscape visual character, intactness, lighting, and glare are described in the Inventory Phase. The proposed project's visual compatibility is analyzed by comparing the fit of the project's visual character, intactness, lighting and glare with the same attributes of the natural, cultural and existing project environments. For each of the following environments, analyze how compatible would the project's visual attributes be with the environments' visual attributes, and how this would change the existing conditions described in the Inventory Phase:

- **Natural Environment:** Includes land, water, vegetation, animals, and atmospheric conditions.
- **Cultural Environment:** Includes buildings, infrastructure, other structures, and art or artifacts.
- **Existing Project Environment:** Includes existing ROW grading, constructed elements, vegetation cover, and ancillary visual elements.

Table 4-1 shows the basic descriptive and equivalent numerical values to rate visual compatibility of a project with the existing environments. In an Advanced VIA, the project's visual compatibility is scored using both a descriptive and a numerical value, while the Standard VIA generally relies only on descriptive assessment. However, based on their professional judgement, the VIA preparer should determine if numerical ratings are appropriate even in a Standard VIA.

Table 4-1: Descriptive and Numerical Values for Visual Compatibility and Contrast

Highly Adverse (-3)	Moderately Adverse (-2)	Slightly Adverse (-1)	No Effect (0)	Slightly Beneficial (+1)	Moderately Beneficial (+2)	Highly Beneficial (+3)

4.2.1 Character

With information gathered during the Establishment and Inventory Phases—project visualizations, photo simulations, and other project documentation—compare the

compatibility of the project's visual character with the landscape visual character after the project's completion. The VIA preparer should assess the project's visual character holistically. The focus should not be whether a project's features are good or bad, but how the natural, cultural, and project environments integrate into the landscape character as a whole. The assessment should also be aware of the nighttime effects of lighting and glare, as discussed below, and in further detail in Appendix G.

4.2.2 Intactness

The Inventory Phase establishes the baseline visual conditions, including the intactness of each landscape unit within the AVE. During the Analysis Phase, describe how much that intactness will change for each landscape unit after the project's implementation. This description determines whether the project will be perceived as a visual disruption to the existing landscape character. For instance, describe how well the existing right-of-way and grading (cut/fill slopes and rock cuts) blend in with adjacent landforms, vegetation, and development patterns, and how that would change with project implementation.

4.2.3 Lighting and Glare

Reflections from the windshields of vehicles moving along a newly constructed roadway, highly reflective finish materials sometimes used in projects, solar panels, or glazing can become new sources of substantial light or nuisance glare ("light shining in my window" effect). Similarly, even though good highway lighting greatly improves safety for motorists and pedestrians, and construction site lighting significantly enhances working conditions for highway workers, these light sources can impact the daytime and nighttime environment on the road, within the AVE and beyond (e.g., skyglow). The FHWA Lighting Handbook (FHWA 2012) states that the impact of lighting systems on the environment and abutters should be assessed in all roadway lighting designs. Along the same lines, one of the four Aesthetics questions in the *Checklist* asks whether the project under consideration would "create a new source of substantial light or glare, which would adversely affect day or nighttime views in the area."

Addressing these prerequisites in the VIA report requires the VIA preparer to work closely with the lighting designer, electrical engineer, structural engineer, or architect during the Establishment Phase to identify potential light trespass sources, highly reflective surface materials, or new project areas from which vehicle reflections could result in a nuisance glare to neighbors. Document the existing daytime and nighttime lighting levels in key potential impact areas of the AVE as part of the Inventory Phase. During the Analysis Phase, evaluate the change in lighting levels, and if lighting levels outside of the right-of-way exceed the recommended illuminance and source intensity levels, adjust the lighting design. If this is not possible, potential environmental commitments should be developed. However, it is important to emphasize that the reduction or elimination of light trespass must never take precedence over the provision of adequate roadway safety lighting. For additional information on lighting and glare, refer to Appendix G.

4.3 Visual Contrast

The visual quality attributes of vividness and unity were described in the Inventory Phase. The degree of the project's vividness and unity contrast with the natural, cultural and existing project environments' vividness and unity describes its visual contrast. The analysis considers how the proposed project contrasts with the descriptions of the existing natural, cultural, and project environments in terms of vividness and unity and then rates visual contrast in accordance with Table 4-1. In an Advanced VIA, the project's visual contrast is scored using both a descriptive and a numerical value, while the Standard VIA generally relies only on descriptive assessment. However, based on their professional judgement, the VIA preparer should determine whether numerical ratings might be appropriate even in a Standard VIA.

4.3.1 Vividness

Vividness is the memorability of a project's elements. The degree of vividness of the project within the landscape influences the degree of visual contrast.

4.3.2 Unity

Unity is the cohesiveness of the elements of the project within the existing landscape. The degree of unity of the project within the landscape, as well as whether the unity contributes negatively, positively, or neutrally to the landscape, influences the degree of visual contrast.

4.4 Visual Change

The visual compatibility and visual contrast of the proposed project with the existing or baseline natural, cultural, and project environments are described for each key view.

In Advanced VIAs, visual change is determined as the average of the scores (Table 4-1) established for visual compatibility and visual contrast as shown in Table 4-2 where compatibility and contrast are of the same importance. Weighted averaging and professional judgement should be used to determine visual change for projects where visual compatibility and visual contrast are of unequal importance. Descriptive language is used similarly for standard VIAs.

Table 4-2: Descriptive and Numerical Values of Visual Change

VISUAL CHANGE	Visual Compatibility						
Visual Contrast	**Highly Beneficial (+3)**	**Moderately Beneficial (+2)**	**Slightly Beneficial (+1)**	**No Effect (0)**	**Slightly Adverse (-1)**	**Moderately Adverse (-2)**	**Highly Adverse (-3)**
Highly Beneficial (+3)	Highly Beneficial (3)	Highly Beneficial (3)	Moderately Beneficial (2)	Moderately Beneficial (2)	Slightly Beneficial (1)	Slightly Beneficial (1)	None (0)
Moderately Beneficial (+2)	Highly Beneficial (3)	Moderately Beneficial (2)	Moderately Beneficial (2)	Slightly Beneficial (1)	Slightly Beneficial (1)	None (0)	Slightly Adverse (-1)
Slightly Beneficial (+1)	Moderately Beneficial (2)	Moderately Beneficial (2)	Slightly Beneficial (1)	Slightly Beneficial (1)	None (0)	Slightly Adverse (-1)	Slightly Adverse (-1)
No Effect (0)	Moderately Beneficial (2)	Slightly Beneficial (1)	Slightly Beneficial (1)	None (0)	Slightly Adverse (-1)	Slightly Adverse (-1)	Moderately Adverse (-2)
Slightly Adverse (-1)	Slightly Beneficial (1)	Slightly Beneficial (1)	None (0)	Slightly Adverse (-1)	Slightly Adverse (1)	Moderately Adverse (-2)	Moderately Adverse (-2)
Moderately Adverse (-2)	Slightly Beneficial (1)	None (0)	Slightly Adverse (-1)	Slightly Adverse (-1)	Moderately Adverse (-2)	Moderately Adverse (-2)	Highly Adverse (-3)
Highly Adverse (-3)	None (0)	Slightly Adverse (-1)	Slightly Adverse (-1)	Moderately Adverse (-2)	Moderately Adverse (-2)	Highly Adverse (-3)	Highly Adverse (-3)

4.5 Viewer Sensitivity

Viewer sensitivity is a VIA preparer's judgment based on the viewer exposure and viewer awareness. Use Table 4-3 as a guide for writing a narrative about the sensitivity viewers might have with the potential impacts that will be caused by a project. VIA preparers should evaluate the sensitivity of viewers to change and describe the sensitivity as none, low, moderate, or high (Table 4-5). To determine viewer sensitivity, evaluate three attributes for viewer exposure (proximity, extent or number of viewers, and duration) and three for viewer awareness (attention, focus, and protection) in the context of viewer's assumed preferences for natural harmony, cultural order, and project coherence (FHWA 2015). Also consider the importance of distance zones and movement.

Table 4-3: Viewer Sensitivity Matrix

Viewer Type	Attributes	Visual Quality Preferences
Viewer Exposure	Proximity	Are some viewers closer than others to the impacts? How are impacts affected by distance zones? Which impacts are particularly visible?
	Extent	How many people, and who are affected by the impacts? Which viewer groups are the most affected and why? Are some viewer groups unaffected?
	Duration	How lengthy are the viewing periods? Does the length of time viewing the impact lessen or increase the visibility of the impact to a particular view group? Which viewer groups are affected by dynamic views? How are they affected?
Viewer Awareness	Attention	For which viewer groups are the views in this corridor routine? For which are they unique?
	Focus	Is there a particular visual resource that is an iconic focal point or are views more general?
	Preference	Is the view sensitive based on the viewers' expected visual quality preference?

Source: based on FHWA 2015 (p. 6-7)

4.5.1 Viewer Exposure

Viewer exposure is a measure of the viewer's ability to see a particular object. Viewer exposure has three attributes: proximity, extent, and duration. High viewer exposure helps predict that viewers will be sensitive to a visual change.

- Proximity relates to the position of the viewer in relationship to the object being viewed. The closer the viewer is to the object, the more exposure. Use the distance zones outlined in Section 3.3 to determine the viewer's exposure to the project or the landscape.

- Extent refers to how many people see the object. The more people who can see an object or the greater the frequency with which an object is seen, the more exposure the object has to viewers.
- Duration refers to how long a viewer is able to keep an object in view. The longer an object can be kept in view, the more exposure.

4.5.2 Viewer Awareness

Viewer awareness is a measure of the viewer's recognition of a particular object. It has three attributes: attention, focus, and protection. High viewer awareness helps predict that viewers will have a high sensitivity for any visual change.

- Attention relates to the preoccupation of viewers—are they preoccupied or thinking of something else, or are they truly engaged in observing their surroundings? The more they are observing their surroundings, the more sensitivity viewers will have of changes to visual resources.
- Focus relates to the view. The focus is either wide and the view general or it is narrow and the view specific with respect to visual features. The more specific the focus, the more sensitive a viewer will be.
- Preference for visual quality of scenic resources also affects viewer sensitivity. If the viewer group values aesthetics in general or if a specific visual resource has been protected by local, state, or national designation, it is likely that viewers will be more sensitive to visible changes. Use citizen participation, public meetings, and local publications and planning documents to help determine scenic and visual resources.

Table 4-4 shows the basic descriptive and numerical values for rating the viewer and viewpoint sensitivity of a project and the relationship between the two types of values. While the Standard VIA relies only on descriptive assessment, in the Advanced VIA, the project's viewer and viewpoint sensitivity is scored using both descriptive and numerical values. The six attributes of viewer exposure and awareness are considered when viewer sensitivity is numerically rated; however, these individual attributes are not rated by themselves.

Table 4-4: Standard and Advanced VIA Reports Descriptive and Numerical Values for Viewer and Viewpoint Sensitivity Attributes

None (0)	Low (+1)	Moderate (+2)	High (+3)

4.6 Viewpoint Sensitivity

Viewpoint sensitivity is a judgment of the scenic importance of a viewpoint and whether it is part of an identified scenic resource. Sensitivity is an obvious concern for assessing visual impacts; however, the details of accurate measuring of viewpoint sensitivity have yet to be developed and tested. Sensitive viewpoints can be scenic or visual resources, vistas, landscape, or ocean views important to neighbors or travelers. The degree of

viewpoint sensitivity can be determined based on the VIA preparer's professional judgement adjusted average of three factors – the level of scenic resource designation and importance in the view, the distance of the scenic or visual resource from the project, and the visual quality of the scenic or visual resource. The level of scenic resource designation is high (+3) for nationally or state recognized scenic resources, moderate (+2) for regionally and locally recognized scenic resources, low (+1) or moderate (+2) for visual resources identified by the preparer of the VIA report (based on their professional judgement), and none (0) for scenic and visual resources that are not visible from any publicly accessible viewpoints. The distance from the project viewpoint sensitivity factor is rated: high (+3) when the scenic or visual resource is in the immediate foreground; moderate (+2) when the scenic or visual resource is in the foreground; low (+1) when the scenic or visual resource is in the middle ground; and none (0) when the scenic or visual resource is in the background. The visual quality of the scenic or visual resource should be rated based on its intactness, unity and vividness on the same scale (0 through +3).

4.7 Visual Sensitivity

In Advanced VIAs, visual sensitivity is determined as the average of the scores (Table 4-4) established for viewer and viewpoint sensitivity and then rounded up to a whole number as shown in Table 4-5 below. In Standard VIAs, descriptive language is used based on the values shown in Table 4-5.

Table 4-5: Descriptive and Numerical Values of Visual Sensitivity

VISUAL SENSITIVITY	Viewer Sensitivity			
Viewpoint Sensitivity	**None (0)**	**Low (1)**	**Moderate (2)**	**High (3)**
High (3)	Moderate (2)	Moderate (2)	High (3)	High (3)
Moderate (2)	Low (1)	Moderate (2)	Moderate (2)	High (3)
Low (1)	Low (1)	Low (1)	Moderate (2)	Moderate (2)
None (0)	None (0)	Low (1)	Low (1)	Moderate (2)

4.8 Visual Impact

The primary objective of the Analysis Phase is to determine the visual impact, which combines the foregoing analyses into two assessments: visual change and visual sensitivity. These are then combined to describe the visual impact as either beneficial, none, or adverse. The level of visual impact then determines the level of VIA reporting. Evaluations of visual impact can be combined by reference in a "matrix" table (Table 4-6), which simply calculates the product of the two attributes and assigns a descriptive value.

Table 4-6: Calculation of Visual Impact Based on Visual Change and Visual Sensitivity

VISUAL IMPACT	Visual Sensitivity			
Visual Change	**None (0)**	**Low (1)**	**Moderate (2)**	**High (3)**
Highly Beneficial (3)	None (0)	Low Beneficial (3)	Moderately High Beneficial (6)	Extremely High Beneficial (9)
Moderately Beneficial (2)	None (0)	Very Low Beneficial (2)	Moderately Low Beneficial (4)	Moderately High Beneficial (6)
Slightly Beneficial (1)	None (0)	Extremely Low Beneficial (1)	Very Low Beneficial (2)	Low Beneficial (3)
No Effect (0)	None (0)	None (0)	None (0)	None (0)
Slightly Adverse (-1)	None (0)	Extremely Low Adverse (-1)	Very Low Adverse (-2)	Low Adverse (-3)
Moderately Adverse (-2)	None (0)	Very Low Adverse (-2)	Moderately Low Adverse (-4)	Moderately High Adverse (-6)
Highly Adverse (-3)	None (0)	Low Adverse (-3)	Moderately High Adverse (-6)	Extremely High Adverse (-9)

When the results are presented in a table for each key viewpoint, these evaluations could be reinforced by a color and graphic design coding to make it easier to see the overall pattern (e.g., orange crosshatch for weak and blue crosshatch for strong).

4.9 Level of VIA Reporting

4.9.1 Questionnaire

For projects where no or negligible visual changes to the environment are proposed, it is sufficient to submit the Questionnaire along with a statement indicating why a technical study is not required.

4.9.2 Memorandum

For projects where visual change is expected to be minor, it is sufficient to submit the *Questionnaire* and prepare a brief Memorandum VIA Report that describes the visual issues and how they are resolved.

4.9.3 Standard

For projects where the visual change is expected to be moderate with some public concern and unlikely to be controversial, a standard report is appropriate. The report addresses each of the four VIA phases descriptively. A standardized tabular format is suitable for organizing much of the content. Visual simulations are optional and may include 3D computer graphics. A Standard VIA Report evaluates visual change using descriptive terms, such as those shown in Table 4-4. Visual compatibility and contrast, the two aspects of visual change can be combined as shown in . The evaluation for

visual sensitivity extends from no effect (0) to high (3) and does not have negative values. Viewer sensitivity and viewpoint sensitivity can be combined using Table 4-5, based on positive values.

4.9.4 Advanced

For projects where the visual change is expected to be clearly noticeable with moderate to high public concern or where extensive public review is anticipated, or both, an Advanced VIA Report is recommended. The report text addresses in detail each of the four VIA phases and uses both descriptive and numerical rating scales (Table 4-6) to score the visual impact to key views or landscape units. To increase the accuracy of the numerical evaluation, keep scores to an accuracy of two decimal points. Round the resulting product up to whole numbers that range between -9 and +9 for a refined and accurate score. Provide a descriptive value for each numerical value per Table 4-7. Prepare photo-realistic simulations from representative viewpoints as required.

Table 4-7: Advanced VIA Report Numerical Scores and Descriptive Values for Visual Impact

Visual Impact	Descriptive Value	Score
Adverse	Extremely High	-9
	Very High	-8
	High	-7
	Moderately High	-6
	Moderate	-5
	Moderately Low	-4
	Low	-3
	Very Low	-2
	Extremely Low	-1
None	None	0
Beneficial	Extremely Low	1
	Very Low	2
	Low	3
	Moderately Low	4
	Moderate	5
	Moderately High	6
	High	7
	Very High	8
	Extremely High	9

5. Mitigation Phase (Environmental Commitments)

This section describes the Mitigation Phase, the final phase in the FHWA *Guidelines,* and the measures to address the various visual impacts of the project. The *Guidelines* present mitigation as avoidance, minimization, compensation, and enhancement. If there are impacts, the VIA must state clearly what measures are required to reduce the impacts. The basic project features are addressed during the Analysis Phase.

5.1 Measures to Address Visual Impacts

The key task that is performed in the Mitigation Phase for projects with adverse visual impacts is a clear identification of the proposed environmental commitment measures. For the purposes of this Handbook, the terms avoidance, minimization, compensation, and enhancement are used below to align with the *Guidelines*. However, it is recommended that VIAs present the proposed measures as "environmental commitments" to reduce any possible confusion with CEQA and NEPA terminology.

CEQA and NEPA use the term "mitigation" differently due to how significance is determined. CEQA significance determinations are made for each individual resource and can vary based on the project setting. For NEPA, significance determinations are made for the project as a whole. Under CEQA, an environmental commitment measure is only called "mitigation" if it is a measure specifically proposed to reduce a significant impact. Under NEPA, mitigation is used as a broader term encompassing all efforts to reduce impacts. The PDT is responsible for making the final determination on significance (with deference given to the environmental staff), and therefore, technical studies (including the VIA) should not include significance calls and should only list corrective measures that have been approved by the PDT. Such approval usually comes after completion of the VIA, and therefore it is a best practice to avoid using the terms "significance" and "mitigation;" the terms "measures" or "commitments" avoid this CEQA terminology issue. Note that guidance from our Environmental Division, e.g., in environmental document Annotated Outlines, uses a broad descriptor for all measures: "Avoidance, Minimization and/or Mitigation Measures," aka AMMMs. This may help to avoid having to differentiate between the types of measures.

It is also important to note that every project is different, and a measure that may be minimization for one project could be mitigation for another project. For example, in an urban area where trees are sparse, the removal of several trees may be considered significant under CEQA, and the replanting of these trees would be considered mitigation. However, in a rural area where there is an abundance of vegetation, the same removal of trees may be considered less than significant under CEQA and therefore the replanting of these trees would be considered a minimization measure. For additional information, please see the "Mitigation under CEQA" guidance located on the SER Other Guidance page.

When determining impacts and appropriate measures, take into consideration temporary, permanent, and cumulative impacts. Identify any long-term maintenance

(e.g., graffiti removal, weed abatement) that may be required. In addition, determine if any proposed measures could impact other resources (e.g., a new irrigation system that requires trenching and power supply, which could disturb a culturally sensitive area). Work with the other members of the PDT to ensure the proposed measures do not conflict with any other commitments or design standards (such as the clear recovery zone).

NOTE: The environmental commitment measures listed in the following sections are intended to represent examples and are not an all-inclusive list of possible measures. Chapter 7 of the *Guidelines* provides additional information. Example photos (Figures 5-1 through 5-4) of environmental commitment measures for visual resources follow the Enhancement section (Section 5.1.4).

5.1.1 Avoidance

Avoidance measures are used to avoid potential adverse environmental effects. Examples of commonly used avoidance measures include the following:

- Avoid removing or negatively affecting visual resources such as mature trees and shrub groupings to the extent feasible.
- Work with communities directly affected by a project to avoid disrupting key cultural landmarks that provide orientation and facilitate the pattern of the community.
- Wherever practicable, install utilities underground to avoid visual impacts. In areas with sensitive environmental resources, undergrounding may not be feasible.
- Avoid wetlands, environmentally sensitive habitat areas, or other resources through the establishment of environmentally sensitive areas.
- Work with the PDT to design the project to fit the roadway into the existing landscape and mimic the visual character of native waterways when feasible.

5.1.2 Minimization

Minimization measures reduce known or anticipated environmental effects and can apply to any resource where there is a need for minimization. Examples include:

- Use aesthetic treatments such as adding a design motif to a sound wall.
- Minimize tree and vegetation removals, especially with native trees and vegetation, to maintain the existing visual character.
- Provide contour grading that integrates with the natural terrain where feasible.
- Revegetate disturbed areas with regionally appropriate drought-tolerant or native plant material as appropriate.
- Use materials, forms, and finishes that mimic, complement, or contrast with the existing cultural environment that is visible from the project corridor, as desired by the community.

- Restore staging areas with native vegetation or vegetation representative of preconstruction conditions to the extent feasible.
- Minimize fugitive light from portable sources used during construction or determine if construction adjacent to residences should be limited to daylight hours to minimize impacts to sensitive viewers.
- Incorporate landscaping that can serve as a buffer for nuisance lighting resulting from vehicle headlights and roadway lighting.

It is important to note that some minimization measures (such as environmentally sensitive area fencing, bird protection, traffic control measures, dust control measures, biological and archaeological monitoring, and/or pre-approved and standard procedures to follow in the event of the discovery of biological resources, archaeological resources, or human remains during construction) are included in the Standard Plans and Specifications and should be considered standard project features and not environmental commitments. An example of a visual standard project feature may be erosion control.

5.1.3 Compensation

If it is not possible to avoid or minimize adverse effects, then it may be possible to provide some sort of visual compensation. The *Guidelines* define compensation for project impacts “through other actions, preferably within the project corridor,” that equally compensate for adverse impacts attributed to a project. Compensation actions include the following:

- Replace an adversely affected resource with the same type of resource.
- Provide a substitute for the affected resource.
- Re-establish similar views of an affected resource.
- Create a substitute view of similar visual features or other interesting features.

Ensure that the cost of compensation is included in the project’s budget. Examples include, but are not limited to, the following:

- Replace affected vegetation at an appropriate ratio, preferably within the project limits. NOTE: If on-site revegetation is not possible or does not completely address the impacts, off-site revegetation may be possible. However, if off-site replacement does not provide adequate compensation for adverse visual impacts, discuss compensation with the PDT. Also, discuss replanting plans with a biological specialist, as some measures may compensate for both resources. Ensure consistency with the proposed measures.
- Replace, if feasible, or compensate landowners and neighbors for damaged property or landscape features. NOTE: Discuss this with the PDT, particularly right-of-way staff, to determine the most appropriate measure.

5.1.4 Enhancement

Enhancement measures differ from other environmental commitment measures in that they actively benefit an area or community, even if there is minimal impact. Enhancement measures are an extra effort added to projects above and beyond what may be required to improve aesthetics and may include the following:

- Remove degraded resources.
- Rehabilitate degraded visual resources.
- Add complementary visual aesthetic resources to the natural, cultural, or project environments.
- Screen undesirable views.
- Create desirable views.

Examples of environmental commitment measures for visual resources are shown in the aesthetic treatments in Figure 5-1 through Figure 5-4.

Figure 5-1: Aesthetic treatment for a sound wall

Figure 5-2: Aesthetic treatment for a sound wall

Figure 5-3: Aesthetic treatment for a bridge

Figure 5-4: Aesthetic treatment for a rock wall

A concrete form liner and stain were used to create a barrier that mimics the previous wall to address both cultural and visual impacts.

5.2 Environmental Commitments Record

Each project must have an Environmental Commitments Record (ECR) prepared to effectively track and document the completion of environmental commitments throughout the project delivery process. Typically, the Environmental Planner (Generalist) will gather all the environmental commitments proposed for a project, specify how each commitment will be met, and document the completion of each commitment in an online database. The ECR is considered a living document and is updated continuously for the life of the project. A sample ECR is shown below:

Table 5-1: Environmental Commitments Record

Task and Brief Description	Included in PS&E Package (Y/N)	Responsible Branch/Staff	Action to Comply	Due Date	Task Completed By	Task Completed On	Remarks
VIS-1: Operational lighting of the Project will be designed for safety and will include features that minimize the release of light and glare either upward or toward properties and residences adjoining the Project corridor. Features could include shielding lighting elements, using lower voltage lighting, or incorporating downward casting lighting.	Y	Design	Design lighting to minimize light and glare.	Prior to Construction	Design		

To aid in the completion of the ECR for a project, each VIA (Memorandum, Standard, and Advanced) should ensure that all the environmental commitments are clear, concise, constructable, and biddable. Measures should be written clearly so that the public can understand what will be done. Be concise, and as specific as possible (using quantities/sizes if possible, taking right-of-way and design constraints into consideration). Use positive language such as “20 oak trees shall be planted at this location” or “the 30-foot-high cut slope will be contour graded and seeded with drought-tolerant native species.” Avoid the terms “may or should.” Work with the PDT to ensure that proposed commitments are constructable and biddable (i.e., they are written in a way that can be included in the Plans, Specifications, and Estimates (PS&E) package). VIA Preparers are encouraged to work with the Environmental Planners to determine what information should be included in the ECR and review the project ECR to ensure all visual environmental commitments have been adequately captured.

Refer to the SER, Policy Memos, Mitigation/Environmental Commitments section for additional information.

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7. Glossary

Affected Environment. “As defined by NEPA, this is the ‘environment of the area(s) to be affected or created by the alternatives under consideration’ (40 CFR 1502.15)” (FHWA 2015).

Area of Visual Effect (AVE). Those areas from which the project may be visible. Synonymous with viewshed. “The area in which views of the project would be visible as influenced by the presence or absence of intervening topography, vegetation, and structures” (FHWA 2015).

Background. “The zone that extends from 3–5 miles to infinity miles away from the viewer” (FHWA 2015).

Baseline Conditions. “Existing conditions of the affected environment, affected population, and existing visual quality” (FHWA 2015).

Color. “The light reflecting off of an object at a particular wavelength that creates hue (green, indigo, purple, red, etc.) and value (light to dark hues). (U.S. Bureau of Land Management 1980:15; Federal Highway Administration 1988:40)” (FHWA 2015).

Cultural Environment. The landscape features that are associated with buildings, infrastructure, structures, and artifacts and art.

Cultural Order. What people prefer to see in Cultural Environment (FHWA 2015).

Cumulative Impacts CEQA. “Two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts” (CEQA Section 15355).

Cumulative Impacts NEPA. Impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (Section 1508.1(g)(3)).

Direct Impacts. Impacts caused by the action and occur at the same time and place (Sec. 1508.1(g)(1)).

Distance Zones. “Distance zones are based on the position of the viewer in relationship to the landscape. They are measured from one static point, such as the location of a key view. There are three defined distance zones:

- Foreground: 0.25–0.5 mile from the viewer
- Middle ground: Extends from the foreground zone to 3–5 miles from the viewer
- Background: Extends from the middle ground zone to infinity (Litton 1968)” (FHWA 2015).

Equivalent Focal Length. “The zoom length needed for a digital SLR to have the same zoom length as a 35 mm film camera” (FHWA 2015). The lens focal length that provides the same field of view on a 35mm film camera.

Foreground. “The zone that extends from the viewer to 0.25–0.5 mile away from the viewer” (FHWA 2015).

Form. “‘The unified mass or shape of an object that often has an edge or outline and can be defined by surrounding space. For example, a high-rise building would have a highly regular, rectangular form whereas a hill would have an organic, mounded form’ (U.S. Bureau of Land Management 1980:15; Federal Highway Administration 1988:40)” (FHWA 2015).

Glare. Sensation produced by luminance within the visual field that is sufficiently greater than the luminance to which the eyes are adapted to cause annoyance, discomfort, or loss in visual performance and visibility. Visual impairment caused by a bright source of light, directly visible or reflected by a surface. There are two types of glare:

- Discomfort glare causes an instinctive reaction to close the eyes and look away. This is the type of glare felt when exposed to a potent high-intensity discharge light or when the sun is directly visible through a window. The presence of glare that may over time cause a sense of pain or annoyance and may increase blink rate or even cause tears.
- Disability glare impairs vision but does not cause the same reaction as discomfort glare. If a light source gets reflected on your laptop screen, for example, it does not bother your eyes but distinguishing objects on the screen may be impossible. The presence of an amount of glare so significant as to prevent an individual from seeing adequately. An example of disability glare is a driver's substantially reduced visibility caused by the headlights of an oncoming car.

Illuminance. Density of luminous flux incident on a surface, measured in foot-candles, or fc (or lux [lx]). The illuminance requirements of built environments are determined by their intended purpose, and there are two common units of measurement:

- Lux: equivalent to one lumen per square meter
- Foot-candle: equivalent to one lumen per square foot

Higher illuminance levels make surfaces appear brighter to the human eye and improve visibility.

Illumination. The process of lighting an object.

Illumination value (symbol E). The luminous flux incident on a surface, per unit area.

Illumination vector. A term used to describe the flow of light. It has both magnitude and direction. The magnitude is defined as the maximum difference in the value of illumination at diametrically opposed surface elements of a small sphere centered at the

point under consideration. The direction of the vector is that of the diameter joining the brighter to the darker element.

Impact. “Change. Change can be made to the physical environment (measured by the compatibility of the impact) or to viewers (measured by sensitivity to the impacts). Together, the compatibility of the impact and the sensitivity of the impact yield the value of the impact to visual quality.

- Compatibility of the Impact: Defined as the ability of environment to visually absorb the proposed project as a result of the project and the environment having compatible visual characters. The proposed project can be considered compatible or incompatible. By itself, compatibility of the impact should not be confused or conflated with the value of the impact.
- Sensitivity to the Impact: Defined by the ability of viewers to see and care about a project’s impacts. The sensitivity to impact is based on viewer sensitivity to changes in the visual character of visual resources. Viewers are either sensitive or insensitive to impacts. By itself, the sensitivity of the impact should not be confused or conflated with the value of the impact.
- Value of the Impact: Defined as either a beneficial, adverse, or neutral change to visual quality. A proposed project may benefit visual quality by either enhancing visual resources or by creating better views of those resources and improving the experience of visual quality by viewers. Similarly, it may adversely affect visual quality by degrading visual resources or obstructing or altering desired views” (FHWA 2015).

Indirect Impacts. Impacts caused by the action and are later in time or farther removed in distance but are still reasonably foreseeable. Indirect impacts may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems (Sec. 1508.1(g)(2)) .

Initial value of illumination. The mean value of illumination averaged over the working area before depreciation has started, i.e., when the lamps and fittings are new and clean and when the room is freshly decorated.

Intactness. The degree to which the viewed landscape represents the desired landscape character type; its visual integrity or how well its features “fit” together.

Kelvin. The kelvin is the International System of Units (SI) unit of thermodynamic temperature, equal in magnitude to the degree Celsius, and denoted by the symbol K.

Key View. “A location from which a viewer (traveler or neighbor) can see either iconic or representative landscapes, with or without the highway, of the project corridor. Usually there is at least one key view for each landscape unit. Used for visual simulations” (FHWA 2015).

Landscape Character. The distinctive visual pattern created by the landform and land cover of a place. Land cover includes the natural features of land, water, and vegetation, and cultural features, such as highways and cities. Landscape character descriptions are a combination of the objective information contained within ecological unit descriptions and the cultural values that people assign to landscapes. Together, they help define the meaning of "place," and its scenic expression. Landscape character simply exists, and its description does not include judgments about whether it is good or bad.

Landscape Character Types. The categories of landscape that are recognized as prototypical, e.g., wild, agricultural, rural, suburban, urban, or industrial.

Landscape Units. "Defined areas within the AVE that have similar visual features and homogeneous visual character and frequently, a single viewshed. An 'outdoor room.' Typically, the spatial unit used for assessing visual impacts" (FHWA 2015).

LED (light-emitting diode). Solid-state component that emits light when exposed to electric current. LED lighting represents the state-of-the-art in the industry, outclassing most other types of lighting in terms of energy efficiency, design flexibility, and colors of light available. The LED is the new standard for Caltrans lighting luminaires, replacing types of incandescent luminaires that are less energy efficient.

Light. Visually evaluated radiant energy.

Line. "Perceived when there is a change in form, color, or texture and where the eye generally follows this pathway because of the visual contrast. For example, a city's high-rises can be seen silhouetted against the blue sky and be seen as a skyline, a river can have a curvilinear line as it passes through a landscape, or a hedgerow can create a line where it is seen rising up against a flat agricultural field. (U.S. Bureau of Land Management 1980:15; Federal Highway Administration 1988:40)" (FHWA 2015).

Lumen (lm). The SI unit of luminous flux used in describing the total light emitted by a source or received by a surface. (A 100-watt incandescent lamp emits about 1200 lumens.)

Luminaire. A complete lighting unit, which includes the lamp, the ballast or driver, internal wiring, reflectors, lens, and any additional components required to deliver light. A complete lighting unit consisting of a lamp or lamps together with the parts designed to distribute the light, to position and protect the lamps, and to connect the lamps to the power supply. Sometimes includes ballasts and photocells. The assembly that houses the light source and controls the light emitted from the light source.

Middle Ground. "The zone that extends from 0.25–0.5 mile to 3–5 miles away from the viewer" (FHWA 2015).

Mitigation. The FHWA Guidelines reference the NEPA definition of mitigation located in 40 CFR 1508.1(s). Note, the definition was previously located in 40 CFR 1508.20. Mitigation under NEPA includes avoiding, minimizing, rectifying, reducing, or

compensating for impacts. Under CEQA, mitigation refers to measures that are proposed to reduce an impact that has been determined to be significant (PRC 21100(b)(3)).

Natural Environment. The landscape features that are associated with landform, water, vegetation, animals, and atmospheric conditions.

Natural Harmony. What people prefer to see in Natural Environment (FHWA 2015).

Permanent Impacts. “Impacts resulting from construction activities lasting for 2 or more years, the built project, or the operations and maintenance associated with the built project” (FHWA 2015).

Project Coherence. What people prefer to see in Project Environment (FHWA 2015).

Project Environment. The landscape features within the project area that include highway geometrics, grading, constructed elements, vegetative cover, and ancillary visual effects.

Project Features. Design features included as part of the project description; features required to meet design standards; features generally applied to most or all Caltrans projects, where Caltrans lacks the discretion in the context of a particular project to consider alternative measures, or where a range of other measures has already been considered, such as the Standard Plans and Specifications or as a Standard Special Provision; features required by a non-project specific permit, such as the Caltrans statewide National Pollutant Discharge Elimination System permit and standard Stormwater best management practices.

Project Region. “The 30-mile radius surrounding a project corridor” (FHWA 2015).

Project Vicinity. “The 0.5-mile offset surrounding a project corridor” (FHWA 2015).

Protected Visual Resources. “Components of the natural, cultural, or project environments that are capable of being seen and that are protected under local, state, or federal plans or policies. There are instances where there is an overwhelming community interest in the preservation of the aesthetic qualities of visual resources that although they are not officially protected by local, state, or federal plans or policies, they still warrant protection” (FHWA 2015).

Scenic Resources. Officially designated places or areas that have been designated as important by a recognized authority (e.g., government, conservation NGO) because of their beauty. They may be natural, cultural, historic, or recreational resources and high-use areas. See Appendix A, Identifying Scenic Resources.

Significance. The severity of a visual impact to a project, to be assessed and determined by the Project Development Team. Significance informs whether mitigation measures are required.

Simulations. “Two or three dimensional depictions of the visual character of a future state. Simulations range from artistic renderings to computer animations” (FHWA 2015).

Temporary Impacts. “Impacts resulting from construction or short-term activities that fall within a period of 2 years or less” (FHWA 2015).

Texture. “The perceived coarseness of a surface that is created by the light and shadow relationship over the surface of an object. For example, a rough surface texture (e.g., a rocky mountainside) would have many facets resulting in a number of areas in light and shadow and, often, with distinct separations between areas of light and shadow. Conversely, a smooth surface texture (e.g., a beach) would have fewer facets, larger surface areas in light or shadow, and gradual gradations between light and shadow. (U.S. Bureau of Land Management 1980:15; Federal Highway Administration 1988:40)” (FHWA 2015).

Unity. The harmony, order, or coherence of landscape features. Unity is assessed by considering the visual pattern of a view’s features: dominance, scale, diversity, and continuity.

Viewer Sensitivity. “The degree to which viewers are sensitive to changes in the visual character of visual resources. It is the consequence of two factors, viewer exposure and viewer awareness.

- Viewer Exposure: Viewer exposure is a measure of proximity (the distance between viewer and the visual resource being viewed), extent (the number of viewers viewing), and duration (how long of a time visual resources are viewed). The greater the exposure, the more viewers will be concerned about visual impacts.
- Viewer Awareness: Viewer awareness is a measure of attention (level of observation based on routine and familiarity), focus (level of concentration), and protection (legal and social constraints on the use of visual resources). The greater the attention, the more viewers will be concerned about visual impacts” (FHWA 2015).

Viewers. People who will see the project. They are divided into Travelers who are using the project, and Neighbors who are not using the project.

- Neighbors: Viewers who occupy or will occupy land adjacent or visible to the proposed project. For a complex or controversial project, neighbors can be defined by land-use, including: residential, retail, commercial, industrial, agricultural, recreational, and civic neighbors.
- Travelers: Viewers who use the existing or would use the proposed transportation project. For complex or controversial projects, travelers can be defined by the purpose of traveling, including: commuting, hauling, touring, or exercising travelers; or by their mode of travel as motorists, bicyclists, or pedestrians” (FHWA 2015).

Viewpoint Sensitivity. The sensitivity of viewpoints and areas in the view to the Visual Change associated with the project.

Viewshed. “All of the surface area visible from a particular location (e.g., an overlook) or sequence of locations (e.g., a roadway or trail) (Federal Highway Administration 1988: pp. 26-27)” (FHWA 2015).

Visual Change. The result of the project’s Visual Compatibility and Visual Contrast with the landscape.

Visual Character. “The description of the visible attributes of a scene or object typically using artistic terms such as form, line, color, and texture” (FHWA 2015).

Visual Compatibility. The project’s effect on the Intactness of the existing Landscape Character.

Visual Contrast. The result of the project’s effect on a view’s unity and vividness.

Visual Features. “Components of the natural, cultural, or project environments which are capable of being seen.

- Cultural Visual Resources: The buildings, structures, and artifacts which compose the cultural environment. These are resources which were constructed by people.
- Natural Visual Resources: The land, water, vegetation, and animals which compose the natural environment. Although natural resources may have been altered or imported by people, resources which are primarily geological or biological in origin are considered natural. A grassy pasture with rolling terrain, scattered trees, and grazing cows, for example, is considered to be composed of natural visual resources, even though it is a landscape created by people.
- Project Visual Resources: For highway transportation projects, the geometrics, structures, and fixtures which compose the project environment. These are the constructed resources which were or will be placed in the environment as part of the proposed project” (FHWA 2015).

Visual Impact. The interaction between the degree of visual change and visual sensitivity. “Changes to visual resources, viewers, or visual quality” (FHWA 2015).

Visual Quality. A description of a view’s formal attributes of intactness, unity and vividness. “What viewers like and dislike about visual resources that compose the visual character of a particular scene. Different viewers may evaluate specific visual resources differently based on their interests in natural harmony, cultural order, and project coherence. Neighbors and travelers may, in particular, have different opinions on what they like and dislike about a scene.

- Natural Harmony: What viewer likes and dislikes about the natural environment. The viewer labels the visual resources of the natural environment as being either

harmonious or inharmonious. Harmony is considered desirable; disharmony is undesirable.

- Cultural Order: What a viewer likes and dislikes about the cultural environment. The viewer labels the visual resources of the cultural environment as being either orderly or disorderly. Orderly is considered desirable; disorderly is undesirable.
- Project Coherence: What the viewer likes and dislikes about the project environment. The viewer labels the visual resources of the project environment as being either coherent or incoherent. Coherent is considered desirable; incoherent is undesirable" (FHWA 2015).

Visual Resource. Natural and cultural features (e.g., land, water, vegetative, animal, or human-created) that are visible and contribute to landscape character and visual appreciation of the landscape.

Visual Sensitivity. The result of Viewer Sensitivity and Viewpoint Sensitivity.

Visual Simulations. Perspective images of the project, typically from a key viewpoint. They may be sketches, computer drawings, animations, or videos. The current best professional practice is to use photo-realistic simulations that are created by combining a rendered digital 3D model of the project with a photograph.

Vividness. The memorability of a view. It is assessed by considering a view's visual elements: form, line, color, and texture.